Published every Saturday by the Simmons-Boardman Publishing Company, 1309 Noble Street, Philadelphia, Pa., with editorial and executive offices: 30 Church Street, New York, N. Y., and 105 West Adams Street, Chicago, Ill.

SAMUEL O. DUNN, *Chairman of Board*
HENRY LEE, *President*
LUCIUS B. SHERMAN, *Vice-Pres.*
CECIL R. MILLS, *Vice-Pres.*
ROY V. WRIGHT, *Vice-Pres. and Sec.*
FREDERICK H. THOMPSON, *Vice-Pres.*
GEORGE SLATE, *Vice-Pres.*
ELMER T. HOWSON, *Vice-Pres.*
F. C. KOCH, *Vice-Pres.*
JOHN T. DEMOTT, *Treas.*

CLEVELAND
Terminal Tower

WASHINGTON
832 National Press Building

SAN FRANCISCO
58 Main St.

Editorial Staff
SAMUEL O. DUNN, *Editor*
ROY V. WRIGHT, *Managing Editor*
ELMER T. HOWSON, *Western Editor*
H. F. LANE, *Washington Editor*

B. B. ADAMS
C. B. PECK
W. S. LACHER
ALFRED G. OEHLER
F. W. KRAEGER
E. L. WOODWARD
J. G. LYNE
J. H. DUNN
D. A. STEEL
R. A. DOSTER
H. C. WILCOX
NEAL D. HOWARD
CHARLES LAYNG
GEORGE E. BOYD
WALTER J. TAFT
M. H. DICK

The Railway Age is a member of the Associated Business Papers (A. B. P.) and of the Audit Bureau of Circulations (A. B. C.).

Subscriptions, including 52 regular weekly issues, payable in advance and postage free; United States and possessions, 1 year $6.00, 2 years $10.00; Canada, including duty, 1 year $8.00, 2 years $14.00; foreign countries, 1 year $8.00, 2 years $14.00.

Single copies, 25 cents each.

Railway Age

With which are incorporated the Railway Review, the Railroad Gazette and the Railway Age-Gazette. Name registered U. S. Patent Office.

Vol. 96 June 30, 1934 No. 26

In This Issue

Large Freight Station to Be Opened in New York ..... Page 944
A description of the New St. John's Park terminal of the New York Central, which covers three city blocks and has tracks for 150 cars on the second floor.

Signaling Eliminates "Bottle Neck" 955
Tells how congestion on 14-mile double-track section in four-track line was relieved by rehabilitating automatic block system.

A. R. A., Mechanical Division, Reports Notable Progress in Research 967
A review of the past year's activities and a summary of committee reports presented at Chicago meeting of General committee.

EDITORIALS

Government Policies and the Railroads 941
Railroad Men and Highway Safety 943

GENERAL ARTICLES

Large Freight Station to Be Opened in New York 944
Freight Car Loading 948
"Wings of a Century" 949
Superintendents Meet in Chicago, Part I 951
What Constitutes a Reportable Injury? 953
Signaling Eliminates "Bottle Neck" 955
Mexican Operating Men Hold Annual Convention 956
Ten Years' Locomotive Development Unutilized 959
New Materials Change Outlook for Freight-Car Construction 961
Developments in the Use of Diesel Power 963
Style Becomes a Factor of Importance in Passenger-Car Design 965
A. R. A., Mechanical Division, Reports Notable Progress in Research 967

NEW APPLIANCES FOR LOCOMOTIVES AND CARS 975

COMMUNICATIONS 992

ODDS AND ENDS 993

NEWS 994

The Railway Age is indexed by the Industrial Arts Index and also by the Engineering Index Service



MODERN

"Modern — pertaining to the present or recent period; belonging to or characteristic of time not remotely past; not ancient, antiquated or obsolete; —"
STANDARD DICTIONARY

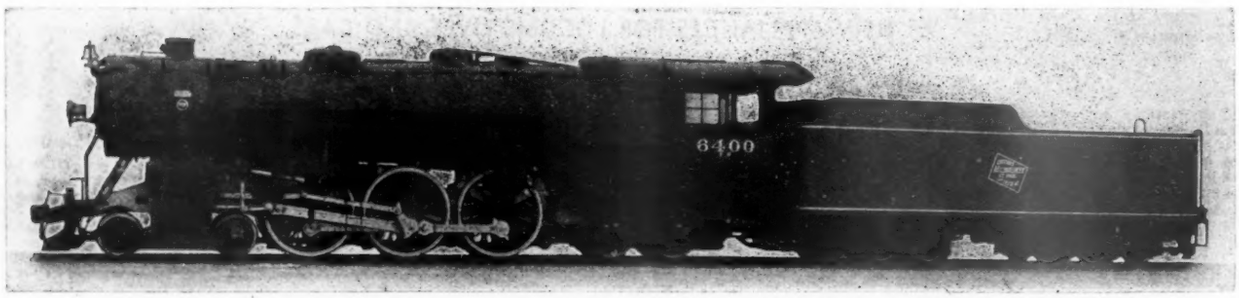
To be truly modern a locomotive must be able to meet today's requirements as to tonnage, high average speed and economy of operation and maintenance. It must have big drivers and adequate boiler capacity. It should be designed specifically for the service in which it is to operate.

Locomotives more than 10 years old — estimated at 88% of the total ownership — are now economically obsolete for most forms of service.

Even some of the newer locomotives do not have the big drivers necessary to enable them to operate with speed and economy under today's conditions.

Modern Locomotives give lower operating costs!

THE BALDWIN



One of 22 Baldwin Locomotives on the Chicago, Milwaukee, St. Paul & Pacific, Each of which has Averaged Over 10,000 Miles Per Month Over a Period of Several Years. Average Maintenance Cost was 13.6 Cents Per Mile.

RAILWAY AGE

Government Policies and the Railroads

There is a sharp contrast between the promise in Governor Roosevelt's railroad speech at Salt Lake City on September 17, 1932, and the performance of President Roosevelt's administration and the Congress which he virtually controlled.

At Salt Lake City Gov. Roosevelt criticised the Hoover administration because its depression policy was merely to loan the railroads money to prevent general bankruptcy which would occur anyway if their net earnings were not increased. "My policy goes to the root of the difficulty," he said. "While I would do everything possible to avert receiverships which now threaten us, I seek to bring the operating balance sheets of the railroads out of the red and put them into the black. In other words, I want the railroads to stand on their own feet, ultimately to reduce their debts instead of increasing them, and thereby save not only a great national investment, but also the safety of employment of nearly 2,000,000 American railway workers." He advocated reduction of the subsidies received by motor vehicles and the placing of motor transportation "under the same Federal supervision as railroad transportation." He favored reduction of competition between the railroads themselves and effecting economies by reduction of railway facilities and service.

What Has Been Done?

What actually has been done?

1. Subsidies to competing means of transportation have been increased by large federal appropriations for highways and waterways. No legislation for placing either motor or water transportation "under the same federal supervision as railroad transportation" has been passed. No modification of the long-and-short haul section of the Interstate Commerce Act has been made, although it is needed to enable the railways to meet competition, and a bill for the purpose was introduced.

2. The office of Federal Co-ordinator of Transportation was created by the Emergency Transportation Act ostensibly to help reduce railroad competition and effect economies. But provisions were inserted in the bill and accepted by the President which virtually prohibited economies in labor and thereby have prevented any substantial economies.

3. The President and the co-ordinator mediated a dispute regarding restoration of the 10 per cent deduction from basic railway wages. They used their influence to postpone the restoration for six months. The outcome was an agreement under which 2½ per cent will be restored on July 1, 5 per cent on January 1, 1935, and 2½ per cent on April 1. On the basis of the pay roll in the first quarter of 1933, this will increase wages at the rate of about $3,500,000 monthly on July 1, by an additional $7,000,000 monthly on January 1, and by an additional $3,500,000 on April 1, making a total increase of $14,000,000 monthly.

Increased Expenses Caused by Government

4. Almost without discussion, Congress passed a bill to provide retirement pensions for employees which will increase railway operating expenses about $5,000,000 monthly. This bill was opposed by Co-ordinator Eastman, rather as a practical matter than because he opposed pension legislation; and it may be vetoed by the president.

5. Congress passed legislation which virtually abolished "company unions" and created national boards of adjustment. It was opposed by the railroads, increases the power of the labor union leaders, and therefore will reduce the power of the managements to operate efficiently and economically.

6. Under N.R.A. wages have been increased, working hours reduced, and consequently, prices have been advanced by industries from which the railways buy equipment, materials and supplies.

7. At the request of the administration the railways have made reduced rates on relief supplies shipped

by the government for the unemployed and drouth sufferers. The National Housing Act contains a provision contemplating reduced rates on building materials. While other industries have been encouraged and aided by the administration to advance their prices, including those charged the railways, it has asked the railways to aid it by reducing their rates.

8. Increased government loans have been made to the railways at reduced rates of interest, but almost every economic policy of the administration has, as shown above, tended to curtail net earnings, and thereby both to increase the need of loans and reduce ability to meet principal and interest.

It is impossible now to estimate the adverse effect upon railway net earnings of the reduced rates already secured by the government, and of the increases in prices caused by N.R.A., but it is and will be important. The increases in wages to be made by April 1 and the pension legislation would increase operating expenses almost $20,000,000 a month. Normally about 26 per cent of annual net operating income is earned in the first four months of the year. Net operating income earned in the first four months of 1934 was $145,000,000. Without the prospective increases in expenses due to increases in pensions and wages, this would forecast net operating income in 1934 of $600,000,000. The wage settlement and pension legislation would reduce this in 1934 by $45,000,000 and in 1935 would cost $217,500,000.

Increased Difficulties of Railways

The agreement for restoring wages to the highest level in history was predicated upon the assumption that general business and railway earnings would continue to improve. Congress did nothing to increase earnings by reducing the government-made competitive disadvantages from which the railways suffer. The improvement in general business which was renewed in November ceased in March. Car loadings in the first quarter of 1934 were 62.3 per cent of the 1925-1929 average, but in the second quarter only about 60 per cent of it. Apparently they will be less in July than last year.

The President can still veto the pension bill. Even if he does, increases in costs due to N. R. A., advances in wages, reductions of rates, the failure of Congress to pass any constructive transportation legislation and the recession of general business, unless it is arrested, will threaten the railways with as serious a situation as they have confronted since the improvement in general business began at about the time almost two years ago when Mr. Roosevelt made his encouraging Salt Lake City speech. With net operating income now running at the rate of only about $600,000,000 a year, and prospective increases of wages and pensions which, after the first quarter of 1935, would be at the rate of $230,000,000 a year, only an early and very substantial improvement in general business and traffic can save the railways from the necessity of again drastically reducing employment and purchases.

The administration can hardly wish to have them largely reduce the number of their employees and their purchases from the capital goods industries, with consequent reduction of employment in those industries.

Will Business Improvement Be Resumed?

The President can reduce the danger of this by vetoing the pension bill. However, the most important question for the railways as well as every other industry, and all the people, is as to whether the upward trend of business in general and railway traffic in particular will soon be resumed. Their general trend has been upward for almost two years, although since March, for the third time within these two years, it has turned downward. Among business men and economists, excepting the brain trusters, there is now little disagreement that the principal reason for this is the economic policies of the administration. How they tend to hinder recovery could not be better illustrated than by the facts given herein regarding their effects upon the railroads. The expenses of the railroads have been increased, while the growth of their traffic and earnings has been hindered by failure to enact constructive transportation legislation and by policies which have inspired business men with uncertainty and fear, delayed the adoption of aggressive sales policies and prevented the revival of private investment on a large scale without which there can be no substantial revival of the capital goods and service industries.

Politicians Versus Business Men

The President, General Johnson, Brain Truster Tugwell and other spokesmen of the administration, according to newspaper reports, are going to take the stump. They will have to do more than present and defend what they and Congress have done if they are going to help business. The Literary Digest poll may be comforting to many politicians, but it has no business significance. A large majority of business men today regard the administration's economic policies with disgust, indignation and apprehension, and only after the government becomes the sole manager of finance, production and commerce will the views of politicians regarding government policies affecting business become as important as those of business men. The politicians in control of the government and business men are now virtually in a deadlock. Full economic recovery cannot occur until this deadlock is broken. It can be broken only by having politicians take over the complete management of business, or by having politicians begin to say and do things which will give business men confidence and courage.

Meantime business men have their duty to perform. One part of it is to go ahead and conduct business as well as they can. Another part is to join in a campaign of public education which will help to defeat for re-election next fall many of the senators and congressmen who have been doing all they can to ruin business in the name of "reform."

Railroad Men and Highway Safety

Interests engaged in the commercialization of the public highways for private profit have questioned the propriety of the concern which railroad men have shown regarding some of their activities. Ted V. Rodgers, president of the American Trucking Associations, Inc., in a circular letter to members of that organization called disapproving attention to the presence of railroad men at the National Conference on Street and Highway Safety in Washington last month which refused to recommend to the states the ultra-liberal uniform limitations on motor vehicle weights being urged by the truck associations and their allies, among which is included the United States Bureau of Public Roads, and asserted that these railroad men "turned the deliberations from one of scientific discussion of highway safety problems to an unveiled attack on the competitive aspects of highway transportation."

The question raised is one of some importance—Have the railroads and their employees any moral right to interest themselves in the regulation of highway traffic and the safety of highway transportation? A letter written recently by a railroad employee—a station agent—in a Middle Western state has a bearing upon this. We quote:

> I received word my mother was very sick. I dropped everything and made a hurried trip to southwest Texas; just got back and was getting started again when on my birthday, May 25, I received word my daughter was killed in an auto accident in ————, the accident involved two trucks and a pleasure car, two in the pleasure car were killed instantly and a third, a young girl of 20 years, still unconscious on the evening of June 4, has her neck broken, leg broken in two places, a skull fracture, arm broken, and shoulder broken.
>
> We brought our daughter to ———— for burial. Feeling I would need my car, I decided to drive it to ————, on highway —— just south of ———— a big gasoline truck headed right for me and on account of other cars close behind him on their proper side of the highway I could not take to the wrong side and avoid the truck so took the ditch. It is a miracle some of us were not killed or seriously injured.

We submit that a man who has had the harrowing experience of this railroad employee—and any railroad employee or other normal user of the highway is potentially in his position—has a far better right to be represented and heard at a conference called to promote safety upon the highways than has any group of trucking interests whose main concern at such a meeting is to secure from it the approval of heavier—and hence more deadly—vehicles on the highways.

The truck organizations blame railroad representatives for the failure to secure approval of the gigantic vehicles by the Conference. They do not emphasize the opposition their proposals met from leaders in the safety movement who have no possible object in view except the promotion of safety on the highways. F. C. Lynch, director of the Kansas City Council, made the position of safety leaders clear at the Conference when he said (in part):

> I am glad the chair asked me which side I was on and whether I was subsidized by either of the two groups represented in this rather important controversy. I might say in the beginning that I happen to have chosen the side which I understand is supported by the steam railroads, but I have no brief for the steam railroads. In my particular business I never have felt that they have ever given me a square deal and financial support. I do have a lot of friends sitting on the other side of this particular group, fellows who have entertained me royally on other occasions, for example when I was in the market for some buses, and I really feel that on this occasion I have deserted my friends in order to stand up for a principle which I think is an important principle, and gone with people who have not been so kind to me.
>
> The question which seems to mystify me in this whole thing is on what basis this conference has been determining the figures submitted to you. There seems to be no other basis taken into consideration by the learned people who have submitted to you these figures except the thickness of the concrete and the strength of the bridge. I ask you if that is the only measuring stick that we are using to determine the manner in which vehicles will use our highways. Isn't there going to be any consideration given to those people who are using the highways for purposes other than this freight transportation? Isn't there any consideration for those people who might be living along the highways? That doesn't seem to be in their minds.
>
> I never have heard mentioned by any of that group any possibility as to the limitation of weights. They go on and on, and if the concrete was thicker and the bridges were stronger they would tell you that it would be safe to operate vehicles with 100,000, 200,000 and 300,000 gross pounds. You know that there is a limit.
>
> It is a vicious circle. The road builders prescribe certain roads and they build them, and the truckers want more weights and the road people say, "We can build you bigger roads," and they build bigger roads, and they get bigger trucks and then they build bigger roads. Isn't there any stop to this thing? I say there must be.
>
> Of course, you say, we operate the private passenger cars. Yes, we do. A little 1,500-pound or 2,000-pound car beating it down the highway misses a turn. Well, it probably will go off in the ditch, it may turn over on its side and bend the fender and a bumper and knock down a couple of telephone poles and a couple of hedge trees, and it will get stopped because there is not much kinetic energy there to be absorbed by these bumps from here to there, but what about it when one of these big boys, 56,000 pounds, gets out of control going down the highway? What is it going to do? It is going to take everything in front of it.
>
> We had a little experience in my town just the other day where there was a transport truck with one great big truck on top of another. This truck was coming down the road and was struck by a small vehicle on the left side just about the driver's seat. It was only going twenty miles an hour, estimated by people who saw it. But what happened? It knocked the driver out of his seat, went over into the curb, knocked down a telephone pole, went through a brick wall into a blacksmith shop and killed the man. Do you tell me the weight of that vehicle didn't have anything to do with it, that that vehicle was as safe as if it had been a two-ton truck? Why, they're just kidding you, that's all.

The position the railroads and railroad employees have taken in the matter of reasonable restriction of the size and weight of commercial vehicles using the public highways is one which is fully supported by disinterested experts whose interest lies in highway safety and nothing else. It is strange indeed that while such experts have found railroad men willing to aid them in their important task of reducing the carnage on the highways, the commercial users of these highways have shown no concern about the dangers inherent in excessive weights and seek them regardless of the advice of safety experts as to what their results will be.

If railroad men are to be criticized at all, the criticism should be based not upon the interest they have shown but rather upon the slowness with which their wrath and that of other highway users has been provoked by the unconscionable toll of highway casualties, to which the operators of giant commercial vehicles are contributing so greatly.



The New Terminal Covers Three Large City Blocks in Lower New York

Large Freight Station to Be Opened in New York

New St. John's Park Terminal of the New York Central, covering three city blocks, has tracks for 150 cars on the second floor



Looking South Over the Elevated Approach to the New St. John's Park Terminal

ON July 2, the New York Central will put in service in New York City a large modern freight terminal, which is designed and equipped to afford maximum convenience and service to shippers and to give the railroad the greatest efficiency and economy in the handling of freight. This new terminal, which is a 3-story section of an ultimate 12-story structure, covering three large city blocks and with track capacity for 150 cars on its second floor level, is an integral part of extensive improvements which the road is making in its freight line along the west side of Manhattan island. Many phases of these improvements have already been completed, as was pointed out in last week's issue which contained a description of the track elevation on the lower west side of the island for a distance of approximately 2.3 miles. The newly elevated tracks terminate directly within the new freight terminal.

Details of Building Construction

The freight terminal, which is known as the St. John's Park Freight terminal, is located on the west side of the city, about 1¼ miles from the lower end of the island. This new facility will replace the historic old freight terminal of the same name, a three-story brick structure covering a large city block, located at St. John's Park, about six blocks further south.

The essential difference between the old terminal, built in 1868 and for many years one of the landmarks of New York, and the new terminal, is the fact that whereas the old building is served by tracks at the street level, all of the track facilities at the new terminal are at the second floor level, from 23 to 25 ft. above the surrounding streets, with the main freight handling platforms on the ground floor beneath. The abandonment of the old terminal, with its eight tracks of eighty cars capacity, will remove all train movements from the streets approaching the terminal, and, of still greater importance, will do away with the large amount of switching that has been necessary in Hudson street, directly at the terminal.

The new St. John's Park Freight terminal, which has only three floors and a basement at the present time and covers only two-thirds of the area to be developed ultimately, is bounded by West street on the west, Washington street on the east, Clarkson street on the north and Charlton street on the south, and covers three full city blocks. The area occupied by the building is 282 ft. wide at Clarkson street, 224 ft. wide at Charlton street, and 802 ft. long between these streets, involving in excess of 200,000 sq. ft. King and Charlton streets are closed across the property, while West Houston street is open and extends directly through the building, dividing the ground floor into two separate units, a one-block north unit and a two-block south unit. The basement is divided into three entirely separate one-block units, occasioned by the piping in the cross streets. The second and third floors are in no way affected by the cross streets and are continuous throughout, being carried over West Houston street on deep girders of 72-ft. span. The construction of the new terminal required the purchase and razing of many buildings, from small private dwellings to multiple-story tenements and warehouses,

which work, in itself, required practically a year to complete.

The new building is a steel-frame structure, fully fireproofed with concrete, and is entirely enclosed with brick walls, large areas of sectional steel sash and numerous large steel freight doors. The exterior of the building is finished with brick in a range of buff, above a granite base course, and is trimmed with Indiana limestone.

The floors are concrete slabs supported on structural steel, this design having been adopted because of the variable column spacing and loading requirements necessary. The column spacing in a north and south direction is approximately 24 ft. 2 in., providing adequate tailboard space for two trucks between columns, and in an east and west direction varies from about 24 ft. 9 in. to 34 ft. 6 in., occasioned largely by the varying track spacing on the second floor. All of the floors are designed to carry a live load of 300 lb. per square foot, with special consideration being given to the handling of freight containers on lift trucks. The present roof of the building, which will eventually become a fourth floor, is also designed for a live loading of 300 lb. per square foot. To act as a roof temporarily, this future floor was given a drainage pitch with cinder concrete and was covered with built-up asphalt roofing. All of the floors were given a hardened wearing surface to withstand heavy trucking and to facilitate cleaning.

The foundations of the building, with column loadings varying from 1,250,000 to 9,500,000 lb. on the basis of the 12-story structure planned ultimately, are all concrete caissons resting on rock from 60 to 90 ft. below the street level. In all, 311 caissons were put down, all but 4 of which are circular in section and range from 5 ft. 3 in. to 11 ft. in diameter. Throughout most of their depth, open excavation was employed, using orange-peel buckets. When within about 15 ft. of rock, however, the caissons were closed and the final seating operations were carried out under air. All of the concrete used in the caissons was mixed in accordance with the water-cement ratio, and while designed to test 3,000 lb. per square inch, it actually tested from 4,000 to 6,000 lb.

Eight Tracks Serve the Building

The two principal floors of the new station from a freight handling standpoint are the second floor, which is the track-level floor, and the first floor, which is essentially the freight house proper. In the layout of the second floor there are a total of eight tracks, all but one of which extend the full length of the building. These tracks, which are about 25 ft. above the level of West street, are arranged in a group of three in the westerly half of the building, a group of four through the center of the building, and a single track close to the east face of the building. In this layout, minimum track centers of 12 ft. 6 in. are employed. Where lines of columns separate the tracks, the tracks are spaced 16 ft. center to center. All of the tracks are of 105-lb. rail laid on short-length creosoted ties embedded in the concrete of the deck structure.

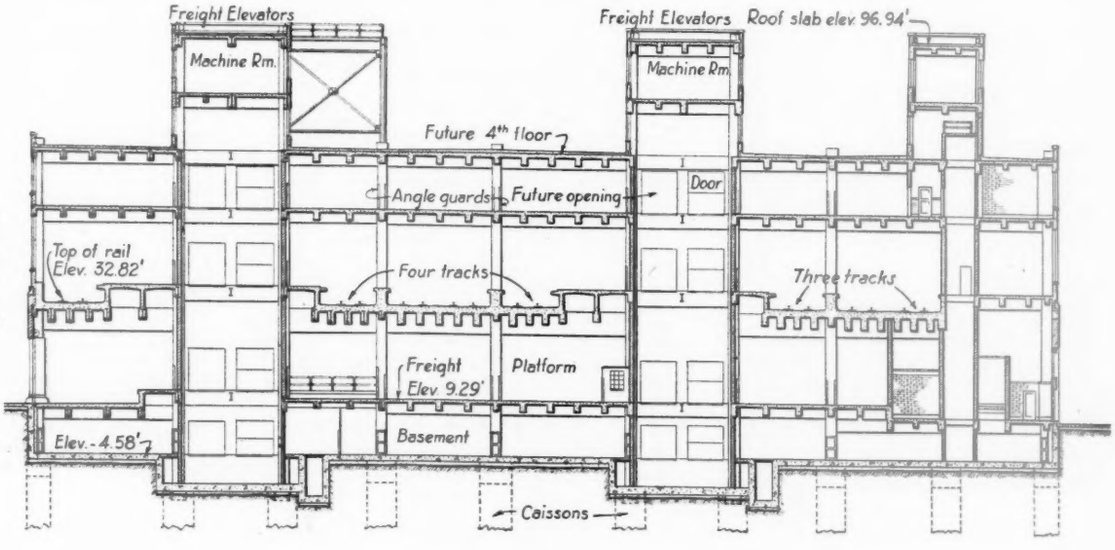
The tracks are served by three car-floor-height platforms, the two larger of which, extending approximately through the center of the building and along the east side, are each 56 ft. 9 in. wide and extend practically the full length of the building. A third platform, wedge shaped in plan and about two-thirds as long as the other platforms, is situated along the west side of the building.

A special feature of the main platforms is the fact that their edges have been specially notched to house the lowered side doors of container cars and thereby permit the opening of the containers while on the cars, or the ready handling of the containers to and from the cars. These notches are essentially continuous recesses in the edges of the platforms, 3½ in. deep and 1 ft. 7½ in. wide, with steel guards at their edges.

All three platforms are served by electric, self-leveling freight elevators, there being a total of 14 such elevators in service at the present time, with provision for a considerable number of additional elevators to be added as conditions may require. Seven of the freight elevators in service serve the long center platform and six of them serve the long east side platform. In both cases the elevators are spaced more or less uniformly throughout the length of the platform in order to minimize trucking distance. Only one freight elevator is provided at present in the shorter platform on the west side of the building.

All but one of the freight elevators have capacity for 20,000 lb., the remaining one having capacity for 15,000 lb. Ten of the elevators serve all floors, including the basement; three of them serve all floors except the basement; while the smallest capacity elevator serves only the first and second floors. Most of the elevators have platforms 21 ft. 8 in. long by 9 ft. 4 in. wide. One, however, has a larger platform, 23 ft. 6 in. long by 10 ft. 4 in. wide, and another a slightly smaller platform, 16 ft. 10 in. long by 9 ft. 4 in. wide.

In addition to the elevators for handling freight, 13 of which are large enough to handle 6 loaded live skids



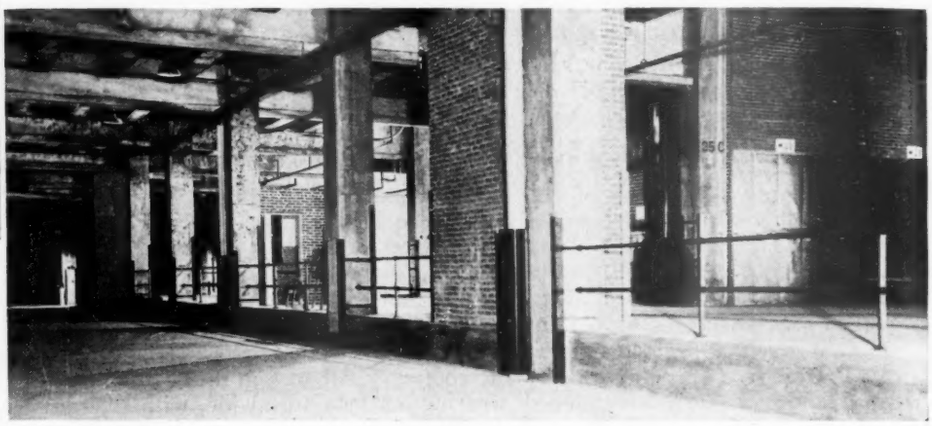
Typical Transverse Cross Section of the Terminal Building Showing the Arrangement of the Tracks and Platforms



Left—The Electric Elevating Tilting Fork Truck to Be Used For Tiering and Icing Cars

operated, are protected against damage by collision by electric light signals which warn enginemen, within or when approaching the building, when the doors are in other than fully opened position.

The ground floor of the terminal, as mentioned previously, is the freight house proper. This floor, which is divided into two separate sections by the crossing of West Houston street, provides large freight handling areas and unusually adequate space for trucks and



Right—A Section of the Main Floor, Showing the Two Levels Necessary

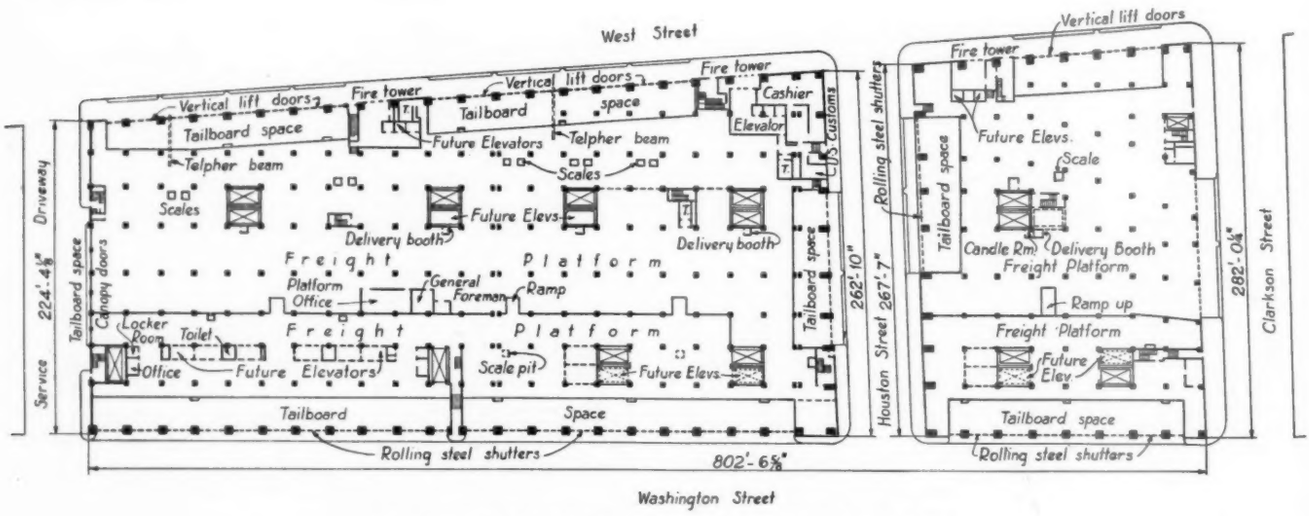
at a time, there is a telfer beam, or hoist runway, at the south end of the building, which extends from within the second floor, out over a wide paved service driveway at the street level. This facility, which is equipped with a five-ton electric hoist, permits the handling of heavy or awkward pieces of freight directly from cars to trucks at the street level, or vice versa.

While the two larger platforms will be used for the handling of general freight, the smaller platform along the west side will be used largely for the handling of perishable freight and dairy products. With this in view, the smaller platform is equipped with two cold storage units for keeping perishable freight which may be held over for any reason. Of these units, which have a combined area of 3,914 sq. ft., one affords a temperature of 33 deg. F. and the other a temperature of 38 deg. F.

The track floor, other than the booths provided for clerks, is not heated, but the temperature can be controlled through the provision of eight large rolling steel shutter doors over the track entrances at the north end of the building. These doors, all of which are motor trailers making collections or deliveries. This floor is on two levels, occasioned by differences in the grades of Washington and West streets, the east level being about two feet higher than the west level. Both levels are at truck tailboard height as regards the streets they serve, 3 ft. 8 in. above the pavement of the truck back-up spaces, and they are joined at intervals by ramps to permit cross trucking.

One of the features of the ground floor is the large amount of tailboard space provided, and the fact that practically all of this space is within the building lines. This arrangement will not only facilitate loading and unloading operations, but will also preclude congestion in the streets surrounding the terminal. Altogether, there is back-up space for 127 trucks, which is distributed on all faces of the building, even under the track viaduct at the north end. All of the truck spaces are 27 ft. 3 in. deep and can be closed at the building line with steel doors. Thus, the entire main floor can be closed in except while admitting trucks to or releasing them from the tailboard spaces.

All of the doors on the Washington, West Houston

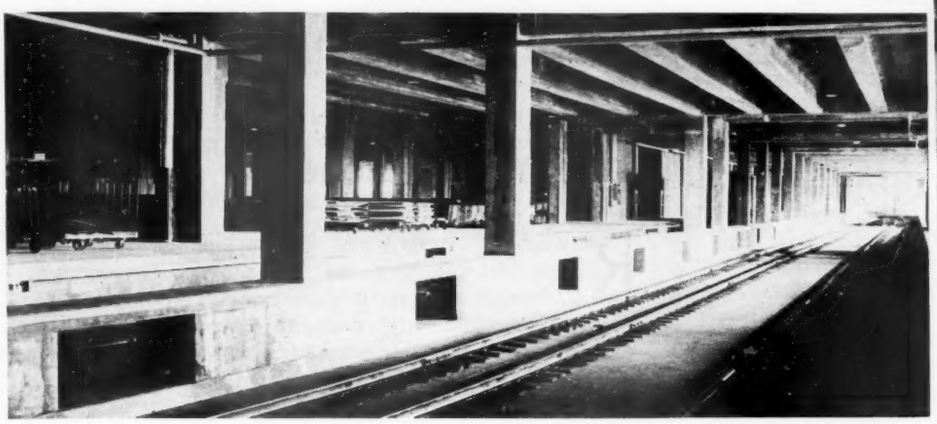


General Plan of the Main Freight House Floor at the Ground Level

and Clarkson street fronts of the building are of the rolling-steel-shutter type, while all of those on the West street side are of the vertical-lift type. The doors on the service driveway at the south end of the building are canopy-type doors, used specifically at this point, where the truck spaces are not recessed into the building, to give some protection to loading and unloading operations. Altogether, there are 44 of the rolling steel shutter doors, 21 of the vertical lift doors, and 8 of the canopy-type doors, all of which, with the exception of the canopy doors, are motor operated.



Right—One of the 14 Self-Contained, Ball-Bearing, Dial-Type Platform Scales Provided



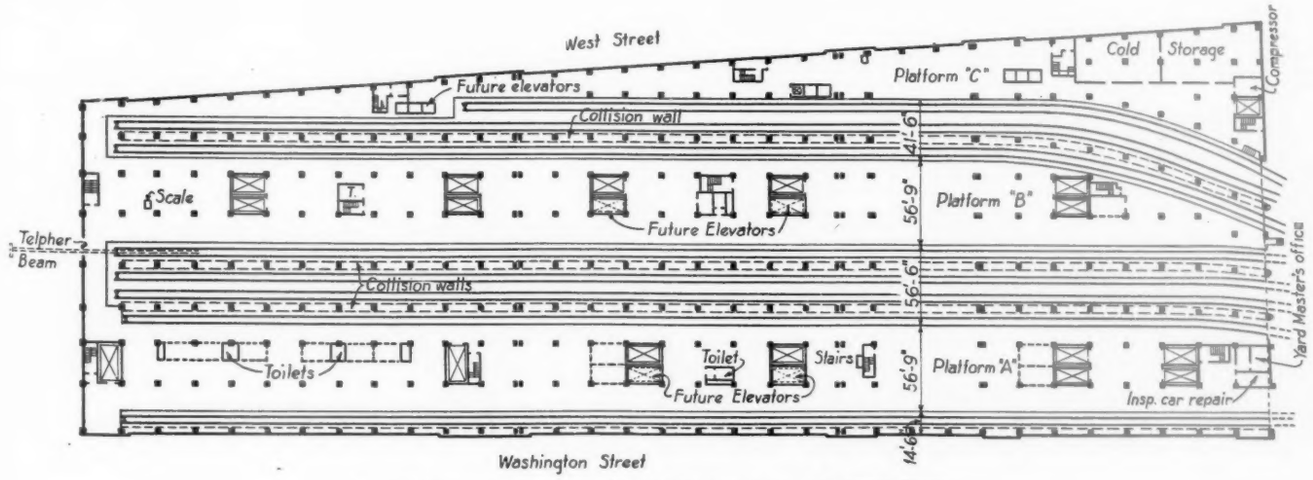
Left—Looking Southeast Over Tracks and Platforms on the Second Floor

Special facilities serving the main floor, other than the elevators which were mentioned in connection with the track-level floor, include essentially scales and the necessary small platform offices and clerk's booths. Fourteen scales are provided at the present time, all of which are self-contained ball-bearing platform scales of the dial type, with 5 ft. by 6 ft. platforms and capacity of 12,500 lb. The scales, which are set in pits and arranged in pairs at the points most advantageous for the freight handling operations, are readily movable and interchangeable.

The third floor of the terminal, which is continuous except for transverse fire walls at about the third points in its length, is to be leased largely for private warehouse purposes. However, a part of this floor along the west side has been reserved for railroad facilities, including freight offices, record storage areas, a repair shop for servicing electric platform trucking equipment, and a section for making repairs to cooperage. The office areas, which house the local freight agent and his force, are served by a passenger elevator and have dumbwaiter connection with the cashier's office on the first floor at the corner of West and West Houston streets. In addition, the agent's office has pneumatic-tube connection with the platform office on the street floor and the delivery clerk's office on the track level, a feature which will speed up the clerical work at the terminal and make messenger service unnecessary.

The three basement sections of the building provide space for storage and for miscellaneous mechanical and electrical equipment. The floor elevation of these sections is about 4½ ft. below mean high water in the Hudson river, which required that an unusually heavy concrete floor be provided and that both it and the walls be thoroughly waterproofed.

While the entire building is of fireproof construction, a dry-pipe automatic sprinkler system has been provided throughout to protect freight and to secure the benefit of a low insurance rate. This system is fed by the city's water supply, but is equipped with four 25,000-gal. supply tanks at the roof level for use in emergency. The sprinkler system is supplemented by a standpipe system which includes a 5,000-gal. reserve supply on the roof and two 1,000-gal.-per-min. fire pumps in the basement.



General Plan of the Track and Platform Layout on the Second Floor

In addition, a complete fire alarm system is provided throughout the building and regular watchman tour service will be maintained.

As already indicated, the only parts of the building equipped for heating are the office areas and the clerk's booths on the different floors. Steam for this heating will be purchased from the New York Steam Company. All of the electricity used for light and power throughout the building will also be purchased.

Lift Trucks and Live Skids Used

In the operation of the terminal, the entire north unit on the ground floor and the west-side platform on the track floor will be used exclusively for the handling of perishable produce, including dairy products. The remainder of the building will be used for the handling of general freight. In general, the West Street side will be used for the handling of westbound, or outbound, freight. Eastbound, or inbound, freight will be handled principally along the Washington Street side, but also at other points as may be found advantageous.

Trucking operations at the terminal will be largely with electric lift trucks and live skids, 7 lift trucks and 800 live skids having been provided. The lift trucks, which have capacity for 6,000 lb., have platforms 2 ft. 4½ in. by 5 ft., and are equipped with hook and eye couplers to permit tractor or trailer operation. The live skids, which have capacity for 4,000 lb., have four wheels, platforms 3 ft. 6 in. by 6 ft., and are also equipped with hook and eye couplers for trailer operations. Five hundred end racks have been provided for use with the skids as required.

Other freight handling equipment provided includes an electric elevating tilting fork truck, 10 low-wheel dollies and 6 two-wheel hand trucks. The electric elevating truck is equipped with two forks which are interchangeable; one, a 30-in. fork of 6,000 lb. capacity, with a lift of 4 ft. 6 in., which will be used for tiering, and the other, a 54-in. fork of 3,000 lb. capacity, with a lift of 9 ft., which, with a portable bin 4 ft. by 5 ft., will be used for icing cars.

Inbound freight received at the terminal will, in general, be loaded directly on to the live skids, and, after being checked and marked, will be moved by hand to the nearest elevator, a distance not exceeding 85 ft. in any case, except on the perishable freight platform. When received at the ground floor, the skids will be moved to the different delivery stations, either by hand or by the electric lift trucks, depending upon the distance. By lowering the sides of container cars into the notches provided in the track platforms, the containers can be either opened and unloaded while on the cars, or removed from the cars, unopened, by the electric lift trucks and trucked directly to the elevators and thence to specific delivery stations on the main floor, or to the basement or third floor.

Heavy or awkward shipments received, which cannot be handled readily by the elevators, will be handled directly between cars and trucks on the service driveway, or vice-versa, by the telfer beam—hoist arrangement at the south end of the building. Other such shipments, but of such nature that they can be handled by the elevators, will be loaded on to the low-wheel dollies at one of the tailboard spaces, a number of which are fitted with telfer beams and hoists for this purpose.

The work involved in the design and construction of the new freight terminal, as well as the track elevation described in last week's issue, was planned and carried out under the late F. B. Freeman, chief engineer of the New York Central until his retirement in September, 1933. Since that time, it has been under the jurisdiction of J. W. Pfau, now chief engineer. All of the work has been executed under the direction and supervision of the Transit Commission of the State of New York, of which William G. Fullen is chairman, and William C. Lancaster is chief engineer.

The general contractor on the building superstructure was the James Stewart Company, and on the foundation work was the P. T. Cox Contracting Company, Inc. The electrical work was handled by Hoffman & Elias, Inc., and the plumbing and steam heating by James H. Merritt & Co. The sprinklers were installed by the Raisler Sprinkler Company, and the elevators by the Otis Elevator Company.

Freight Car Loading

WASHINGTON, D. C.

REVENUE freight car loading in the week ended June 16, amounted to 617,649 cars, an increase of 2,084 cars as compared with the preceding week and of 24,890 cars as compared with the corresponding week of last year. As compared with the week before there was an increase in the loading of miscellaneous freight, grain and grain products, forest products, and ore. As compared with last year there was a decrease in the loading of merchandise, forest products, and live stock. The summary, as compiled by the Car Service Division of the American Railway Association, follows:

Revenue Freight Car Loading

Week Ended Saturday, June 16, 1934

Districts	1934	1933	1932
Eastern	137,595	135,831	118,593
Allegheny	124,685	114,843	99,407
Pocahontas	42,203	40,809	30,515
Southern	83,530	87,051	75,228
Northwestern	90,872	75,983	61,760
Central Western	90,133	85,709	83,591
Southwestern	48,631	52,533	49,274
Total Western Districts	229,636	214,225	194,655
Total All Roads	617,649	592,759	518,398
Commodities			
Grain and Grain Products	33,788	38,251	25,795
Live Stock	12,801	15,468	15,400
Coal	96,428	94,892	68,605
Coke	6,827	4,940	2,941
Forest Products	25,086	25,762	17,140
Ore	33,924	12,937	4,290
Merchandise, L. C. L.	161,393	168,832	175,819
Miscellaneous	247,402	231,677	208,408
June 16	617,649	592,759	518,398
June 9	615,565	569,157	501,685
June 2	578,541	512,974	447,412
May 26	624,567	545,551	521,249
May 19	611,142	535,719	515,628
Cumulative total, 24 weeks	14,133,887	12,092,943	13,120,546

The freight car surplus for the last half of May averaged 355,188 cars, a decrease of 4,372 cars as compared with the first half of the month. The total included 213,138 box cars, 93,329 coal cars, 25,381 stock cars, and 10,117 refrigerator cars.

Car Loading in Canada

Car loadings in Canada for the week ended June 16 increased from 42,933 for the previous week to 44,482 and were greater than in 1933 by 3,911 cars, according to the compilation of the Dominion Bureau of Statistics.

	Total Cars Loaded	Total Cars Rec'd from Connections
Total for Canada:		
June 16, 1934	44,482	21,502
June 9, 1934	42,933	22,810
June 2, 1934	44,614	21,807
June 17, 1933	40,571	19,268
Cumulative Totals for Canada:		
June 16, 1934	1,003,372	560,443
June 17, 1933	825,564	419,367
June 18, 1932	1,001,272	496,137

"Wings of a Century"

Most popular spectacle at World's Fair dominated by railroad influence past and present

THAT the public is intensely interested in railway transportation and its progress is demonstrated by its reception of "Wings of a Century," the pageant romance of American transportation which is rated as one of the most noteworthy attractions at this year's renewal of the Century of Progress Exposition at Chicago. Last year over 800,000 persons attended the 600 performances staged during the 150 days of the Fair, while so far this year the attendance is double that of the same period last year. While the pageant portrays the evolution of transportation from the travois of the Indian to present-day methods, major progress centers around the importance of railway transportation. The story of railway transportation is woven throughout. The story depicted, written by Edward Hungerford of the New York Central, is historically correct in every detail.

From the time the first Indians come upon the huge open air stage, dragging their travois at the heels of their calico ponies, to the last moment when a giant modern locomotive appears before the 170-ft. by 55-ft. grandstand, which is covered by what is said to be the largest one-piece canvas canopy in the world, the audience is witnessing a magnificent spectacle.

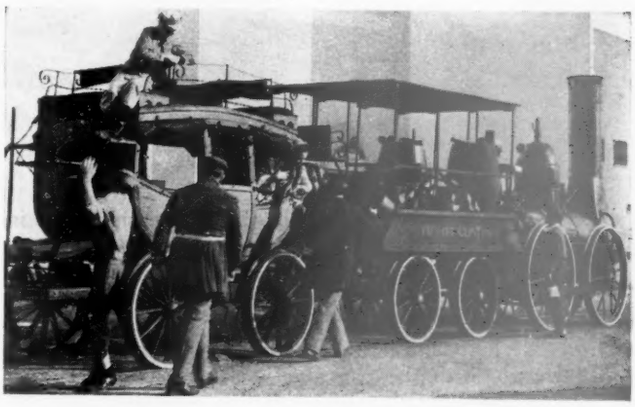
New Scenes Interpolated

For this year's version, two new scenes have been interpolated which add much to the historic sequence of the pageant. One is an episode set in the period from 1830 to 1840 which pictures the Mississippi levee at New Orleans. It introduces a picturesque setting and the general action is suggestive of Mardi Gras time.

The other new scene has to do with the Civil War. Across the stage wends a horse-drawn Union supply train, guarded by a handful of cavalrymen and a detail of infantrymen in blue. They are attacked by a party of Confederate scouts, carrying the flag of the South and after a brisk skirmish, the train makes its escape.

The development of railroad transportation was given added emphasis on the opening night of the production at the World's Fair this year with the exhibit as an epilogue to the pageant of the Chicago, Burlington & Quincy's "Zephyr," which had just completed its record-breaking run from Denver to Chicago on May 26.

The beginning of the era of rail transportation in the pageant dates back to 1830 and its inception is visualized by the arrival of a little car, running on rails and pulled by a gray horse. This car is soon followed by the "Tom Thumb" locomotive, made in 1830 by Peter Cooper for the Baltimore & Ohio. This curious locomotive, manufactured out of anything Cooper found lying about, with gun barrels as flues, begins "The Parade of the Iron Horse." The "DeWitt Clinton" of 1831, first locomotive of the Mohawk & Hudson, which later became the New York Central, goes trundling by with a couple of barrels of firewood to keep up steam. The "Thomas Jefferson," 1836, of the Winchester & Potomac, the first railroad in Virginia, its boiler upright, sprinkles soot and flying sparks generously on the passengers, who ride in coaches like those drawn by horses. Completing the parade are the "Pioneer," 1851, of the Cumberland Valley, now the Pennsylvania; the "Thatcher Perkins," 1863, built for the Baltimore & Ohio during the Civil War; and the "Minnetonka" of the Northern Pacific, manufactured in 1869.

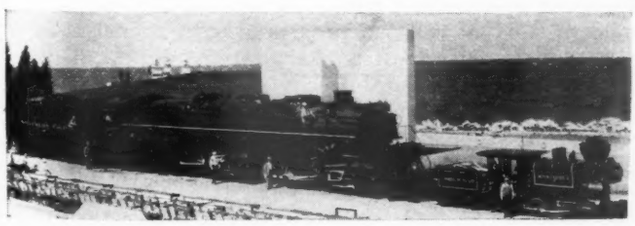


The DeWitt Clinton of the Mohawk & Hudson (now N. Y. C.) and Its Train, Built in 1831, Reflect the Glory of Their Period

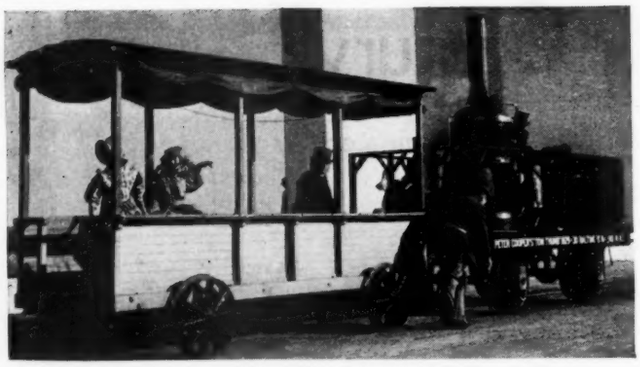
One of the episodes depicted is the completion of the first transcontinental line at Promonotory Point, Utah, in 1869. From Omaha, Neb., the Union Pacific has been building towards the West; from the Sacramento, the Central Pacific towards the East, and the two projects met at Promonotory Point. The locomotives "C. P. Huntington" and old "No. 9," of the Union Pacific appear in this scene.

In an episode reminiscent of the World's Columbian Exposition, held in Chicago 41 years ago, the "999," record-breaking locomotive of the New York Central, appears. This locomotive is credited with having attained the speed of 112½ miles an hour in a run between Buffalo, N. Y., and Rochester in May, 1893. Later that year it was exhibited at the Columbian Exposition.

In the epilogue, or finale, of the pageant colossal locomotives of modern design move across the stage. This year these are being furnished by the Chicago, Rock Island & Pacific; the Chicago & North Western; the Baltimore & Ohio; the Chesapeake & Ohio; the New York Central; the Pennsylvania; the Great Northern



As a Representative of Modern Transportation this Giant Locomotive of the Northern Pacific is a Decided Contrast to this Railroad's Minnetonka—Built 1869



The Tom Thumb Which Peter Cooper Built for the B. & O. in 1830 and which was the Principal Figure in the Historic Race with the Gray Mare, Leads the Parade of the Iron Horse

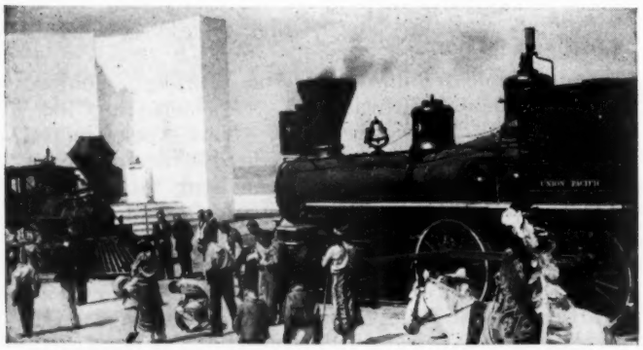
and the Illinois Central, each railroad exhibiting its locomotive in the pageant for two or three weeks.

Two hundred actors participate in the pageant. Tex Cooper, one of the featured players and well past 70, appeared with "Buffalo Bill" Cody at the World's Columbian Exposition in '93 and impersonates him in the '93 episode of the pageant, wearing a white leather jacket trimmed with $20 gold pieces. He also takes the part of a scout, a leader of Confederate cavalry, a southern planter and an express messenger. May Buckley who, among other roles, impersonates the Princess Eulalia, has been on the stage for many years, appearing in support of DeWolf Hopper, Otis Skinner and other famous stars. Barbara Gordon, who appears as Anna Held in the '93 episode of the pageant, has also had a long career in drama and musical comedy.

Their experience, however, does not compare with that of the railway enginemen who drive the old locomotives. Among them is Fred Metcalf, 74 years old, who drives the historic "Minnetonka" of the Northern Pacific, who operated it in actual service about 40 years ago. He retired from service in 1931 after 52½ years and with a record of 1,800,000 miles without injuring a passenger. Indians along the line were still hostile, following the Custer massacre, when he first drove the "Minnetonka" from Brainerd, Minn., to South Rapids.

His alternate at the throttle of the "Minnetonka" is C. A. Kingsley, 77, with a record of 1,400,000 miles and a prized letter from Theodore Roosevelt, praising him for his skilful handling of a presidential special train.

James Stark, 70, who drives the New York Central's "DeWitt Clinton," has been in New York Central service 49 years on the Mohawk division where he has run over 1,000,000 miles. He operated the famous "999" on the New York Central, once with President McKinley in a special car behind and Secretary of War Alger in the cab. In 1894 when newspapers fought each other to gain first delivery of their papers in Buffalo, N. Y., he operated one of the paper trains from Albany, N. Y., to Syracuse, 147 miles, in 2 hr. 8 min., or at an average of 68.9 m.p.h.



Promontory Point, 1869, The Central Pacific's No. 9 Re-enacts the Ceremony Marking the Completion of the Central Pacific from Sacramento and the Union Pacific from Omaha

It was during the Baltimore & Ohio's "Fair of the Iron Horse" at Halethorpe, Md., on September 24 to October 12, 1927, that Mr. Stark demonstrated the quick-wittedness so often required in railroad operating emergencies. As the "DeWitt Clinton," which he was driving, was passing the reviewing stand, he noticed that the back end of the connecting rod on the left side of the locomotive had become disconnected and was whirling through the air, striking the ties and threatening to injure the locomotive and persons nearby. In order not to stop the movement of the pageant, he stepped over to the left side and when the rear end of the rod swung up into the air, caught it with his left hand and continued to hold on to it until the locomotive had passed the grandstand. This act was later recognized by Daniel Willard, president of the Baltimore & Ohio, who was alongside the engine when the accident occurred.

Napoleon Briggs, 72, who runs the "Thatcher Perkins" of the Baltimore & Ohio and old U. P. No. 9, was pensioned on November 11, 1932, after 51 years with the Chicago, Rock Island & Pacific. He has the distinction of having run more miles than any engineman and having carried practically every "movie" star during the 31 years in which he handled the Golden State Limited on the Rock Island. On one occasion he made a special run of 181 miles from Chicago to Rock Island, Ill., carrying a doctor to a sick priest in 3 hr. 25 min., including a 10-min. delay. He also operated the Rock Island's modern 5040 locomotive when it participated.

W. T. Eagan, 75, who operates the "Thomas Jefferson" of the Winchester & Potomac, was pensioned by the Baltimore & Ohio in 1928, after 53 years of service. He began as a telegraph operator in 1875 and later was employed in the maintenance, mechanical and operating departments. He served as road foreman of engines and trainmaster and operated a passenger locomotive for 17 years. Because he was the only person living who was familiar with the details of the "Tom Thumb", he was consulted during the construction of its replica to insure accuracy.

Among the other trainmen in the Wings of a Century are J. P. Schober of the Chicago terminal of the Pennsylvania who runs that railroad's 83-year-old "Pioneer"; E. G. Munson of the Chicago & North Western who operates the Baltimore & Ohio's "Tom Thumb"; William Zimmerman of the Chicago terminal of the Michigan Central who drives the New York Central's "Empire State"; and Thorvid Engquist of the Pennsylvania who operates the Central Pacific's "C. P. Huntington" and the Illinois Central's No. 201.

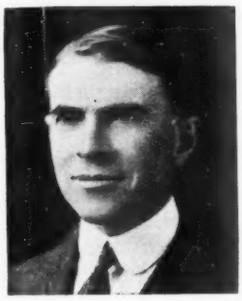
In all, the pageant is an hour of the drama of restless Americans in their efforts to get over the ground, over the water and finally through the air. It depicts an impressive story of railroad progress.

MEMBERS OF THE VANDERBILT RAILROAD CLUB were on June 9 guests of the Baltimore & Ohio for an inspection of its facilities in and about New York. The club is a New York City organization composed of young men interested in railroads. The June 9 tour of B. & O. facilities covered the train-connection motor coach operation, the departure of a New York-Chicago passenger train and an inspection of a B. & O. "President-Type" locomotive.

Superintendents Meet in Chicago

Convention characterized by excellent addresses and valuable discussion

Part I



V. Parvin
President, 1933-34

IN contrast to some previous meetings, the fortieth annual convention of the American Association of Railroad Superintendents, which was held in Chicago on June 19-21, with the expressed approval of the executives of the railways, was a business meeting throughout, without entertainment of any character. In addition to hearing a number of valuable addresses, the members present, some 150 in number, contributed largely to the excellent reports by active discussion and cross-questioning of the committee chairmen to determine how the results quoted were accomplished. Among the addresses was one that aroused special interest, presented by J. R. Turney, director, Section of Transportation Service, Federal Co-ordinator of Transportation, which was published in last week's issue of the *Railway Age*.

The sessions were presided over by V. Parvin, general superintendent, Ann Arbor, Owosso, Mich., president of the association. In his report, President Parvin stressed the importance of the association as an educational medium. The only means available to the young operating officer for educating himself in the complexities of his position, he said, are afforded by the Superintendents' Association and the *Railway Age*, and he cited other railway executives who share this view. President Parvin also outlined the work of the executive council during the year in renewing the interest of the railway executives in the association and expressed gratification as to the number of members present, in view of the fact that the convention was not definitely authorized until May 11. The secretary's report indicated that on June 1, 1933, there were 624 paid up members of the association.

A feature of the meeting was the uniformly excellent character of the addresses delivered, all of which contained valuable material for use by the superintendent in his daily work.

Officers Elected

At the concluding session of the convention, officers were elected for the ensuing year as follows: President, F. O. Coleman, superintendent, M. & St. L., Oskaloosa, Iowa; first vice-president, H. C. Rochester, office assistant to vice-president, C. N. R., Montreal, Que.; second vice-president, J. J. Brinkworth, assistant superintendent, N. Y. C., Buffalo, N. Y.; third vice-president, J. M. Hood, chief operating officer, A. C. & Y., Akron, Ohio; fourth vice-president, C. J. Brown, superintendent, M. P., Osawatomie, Kan.; secretary-treasurer, F. O. Whiteman (re-elected), St. Louis, Mo.; directors (three years) G. J. Shreeve, general superintendent transportation, Belt Railway of Chicago, Chicago; W. A. Aiken, Jr., superintendent transportation, R. F. & P., Richmond, Va.; (two years) Elmer T. Howson, vice-president and western editor, *Railway Age*, Chicago; (one year) J. W. Graves, superintendent, Erie, Hornell, N. Y. Chicago was again selected as the location for the next convention.



F. O. Coleman
President, 1934-35

After the close of the session at noon, Thursday, through the courtesy of the Chicago & North Western, a special train was operated to inspect the Proviso retarder yard and l.c.l transfer station of the C. & N. W., and the Clearing yard of the Belt Railway of Chicago. On Wednesday evening, the members attended en masse the transportation exhibits and the Wings of a Century performance at A Century of Progress Exposition.

Welcome by A. N. Williams

In welcoming the convention to Chicago on behalf of the railways, A. N. Williams, president of the Chicago & Western Indiana and the Belt Railway of Chicago, gave statistics as to the position of Chicago as a railroad center. That the Chicago passenger facilities are not in excess of the city's needs, he said, was indicated clearly on September 4, 1933, when 519 through passenger trains and 439 suburban trains, a total of 958 trains and 7,256 cars, were handled in the Chicago terminals. This traffic, Mr. Williams stated, could not have been handled with less facilities. He indicated that, in freight service, interchange in large terminals was formerly considered in terms of days, but that modern operating efficiency has reduced this to terms of hours and even of minutes in most cases. He also recommended to the superintendents the use of transportation budgets as being particularly necessary with the present day's trend of static or reduced rates and declining revenues. He suggested to the superintendents that, by reason of the service they were in position to offer, they could become the railroads' most valuable freight solicitors if they would contact the shipping public.

W. D. Beck, district manager, Car Service division, American Railway Association, Chicago, in a short talk, urged the superintendents to observe strictly and completely the car service rules, as they presented the most economical manner in which to handle cars and to avoid empty mileage. He also stressed the importance of making all foreign cars earn their way home instead of putting them off on connections in order to avoid per diem.

True Railroad Picture Necessary

H. G. Taylor, chairman, Western Association of Railway Executives, spoke on the importance of convincing the public that the popular idea that railway manage-

ments are unprogressive is false. With freight cars handled declining from 53,000,000 in 1929 to 29,000,000 in 1932, with revenues reduced from more than $6,000,000,000 in 1929 to approximately $3,000,000,000 in 1932, and with expenses cut from $4,506,000,000 in 1929 to $2,403,000,000 in 1932, the railway industry has been practically halved. The superintendent of today, Mr. Taylor said, is compelled to govern his operations by the exercise of the most rigid economy, but, out of the misfortune of the past four years, railway officers, and particularly superintendents, have salvaged a number of valuable things. They have learned to do things that they never did before and, perhaps more important, they have learned not to do things which were considered as practically standard for many years. When the railroads, along with other industries, return to something like a normal basis, they will be able to operate much more efficiently than has ever before been possible, he said. Barring deferred maintenance, the railroads are better fitted today to handle the nation's traffic, whatever its future volume may be, than they ever were before.

In refutation of the popular idea regarding railway management, Mr. Taylor maintained that no industry in the United States has shown more progress and a better sense of responsibility to its patrons than the railroad industry. Railroad men do not take enough pride in their own business, he said. It is necessary that every railroad man, in whatever department, keep himself informed as to the progress of the railway industry and disseminate this information among his friends outside the industry in order to counteract the propaganda being spread at present against the railways. After tracing the improvements in safety, in passenger equipment and in locomotives, Mr. Taylor stated that the railroad man owes it to himself and to the industry as a whole to paint a picture of railroading as it really is. Mr. Taylor closed his address with the statement that our present day transportation system is the result of individual effort and co-operation between individuals, and its success has been brought about in spite of rather than because of government interference and excessive regulation.

G. B. Vilas Speaks

That the superintendent can save more money and promote greater efficiency by cultivating safety than by any other means was stated by G. B. Vilas, general manager, Chicago & North Western, in an address on Tuesday afternoon. Mr. Vilas stated that as superintendent at Baraboo, Wis., in March, 1910, he, together with the late R. C. Richards, father of the safety-first movement, presided over the first safety meeting held on any railroad in the United States. When, in 1929, the responsibility for safety on the C. & N. W. was given to him as general manager, Mr. Vilas, together with other executive officers, made a three weeks' safety tour over his lines, during which they interviewed some 2,800 supervisors. An intensive study of accidents and their cause was also made and Mr. Vilas cited numerous instances of how safety had been promoted on the C. & N. W.

Following a number of accidents from this cause, the riding on footboards of locomotives in the direction of movement was prohibited, and such accidents ceased. To promote safety at grade crossings, orders were issued that train crews standing on sidings awaiting passenger trains, agents when not otherwise occupied, and supervisory officers, including the president, should flag crossings at every opportunity. As a result, grade crossing accidents were reduced 42 per cent. Surprise tests covering the handling of train orders are being made constantly, and this has eliminated a great many of the accidents resulting from the mishandling of train orders.

A type of safety shoe was developed, of which some 10,000 pairs are now being worn by C. & N. W. employees, and foot accidents have been reduced 50 per cent. Following an epidemic of men falling from the locomotives while working on them, all such men are now required to wear safety belts and this cause of accident has been almost eliminated. Similar safety belts are worn by men working in the vicinity of the chutes on ore docks. Everyone on the railroad has been instructed to watch trains as they go by and to report immediately any condition that might cause an accident. The ever present danger, with long freight trains, of a derailed car fouling the opposite track, has been reduced to a minimum by providing all heavy engines which haul such trains with extra red headlights, which enginemen are instructed to turn on whenever making other than a service application of the air brakes. As a result of this precaution, approaching trains have been warned in a number of instances, and have thus avoided what might have been quite serious accidents.

The result of all this care in avoiding accidents is apparent as indicated by the fact that while, in 1928, the casualty rate per million man-hours on the C. & N. W. was 18.22, it was reduced by 1930 to 2.69, and in 1931, the year in which the C. & N. W. won the Harriman safety medal, to 1.59. The casualty rate rose to 1.99 in 1932, but, in 1933, it was reduced to 1.65. In contrast to 32 employees killed and 2,105 injured in 1928, the present average of 5 killed annually and somewhat less than 150 injured, indicates the improvement that has been made.

Freight Claims

In an address on Tuesday afternoon, Joe Marshall, special representative, American Railway Association, pointed out that while loss and damage claims really blanket the railroad, in that they are the responsibility of everyone, they are particularly an operating problem. Mr. Marshall reported a reduction of 87 per cent in the amount paid for loss and damage claims in 1933, as compared with 1920, and stated that the record of the last four years of reduced business has been particularly good. During these four years, the railways loaded 140,286,776 cars of freight. Of this loading, 132,000,000 cars were handled without any claims at all. Mr. Marshall warned, however, that the superintendents should not rest upon their laurels, as loss and damage claims are now averaging 8,000 more per month than last year and during the first quarter of 1934, the amount paid for claims was almost 7 per cent more than the same period last year. He urged that, with the return of business to its normal volume, renewed and vigorous attention be given to the subject of freight claim prevention if the figures are not to mount to their former total. Mr. Marshall concluded his talk by giving to the superintendents a list of nearly 100 ways in which superintendents may prevent loss and damage claims, laying particular stress on claims originating in yards.

The Superintendent and Public Relations

J. M. Fitzgerald, vice-chairman, Eastern Committee on Public Relations, told the superintendents that public relations work is more important today than ever before and that the railways' public relations efforts were not mere idle propaganda, but an earnest and honest attempt to inform the public as to what the railways are doing,

and why they are doing it. A somewhat confused public opinion, he said, has become evident, and the superintendents should take advantage of every opportunity to clarify this public opinion and to acquaint the public with the true facts of the situation, particularly as to competitive agencies of transportation. Not only are the railroads the largest taxpayers of any industry, while trucks fall far short of paying taxes commensurate with the use they make of public facilities, Mr. Fitzgerald said, but railroad taxes go into the general tax fund, while such taxes as the highway users pay are turned back to their benefit in building new highways and maintaining existing highways. In addition to highway competition, he pointed out that money is now being spent by the government to make navigable no fewer than 297 rivers and streams in the United States, many of which could not be found even on a large size map. He warned, too, that the St. Lawrence waterway project, while quiescent for the present, was by no means dead, but was likely to appear again and again. He pointed out that half a century ago, railroad regulation was caused by a desire to arrive at standardized rates, so that business could proceed on some sound basis. Today, as a result of the failure of the government to regulate other forms of transportation, the country finds itself in the same chaotic condition as existed 50 years ago, and business will suffer under the same handicaps as it did then, until highway and other transportation agencies are properly regulated.

Collett and Sawyer Speak

Robert Collett, fuel agent, St. Louis-San Francisco, addressed the meeting on the subject of fuel, the railways' largest expense. He outlined the magnitude of the fuel problem and the important part which the superintendents play in the reduction in fuel expense and also indicated some of the methods whereby the Frisco has made its excellent record in savings in fuel consumption, recommending periodical fuel meetings presided over by the superintendent.

Citing the importance of fuel to the country and the railroads, Mr. Collett said:

In 1880 the population of the United States was 50,000,000. That year, 71,000,000 tons of coal were produced, or 1.42 tons per capita. In 1918 (just 38 years later—the year of the greatest coal production), when the population had grown to 105,000,000, the coal production for that year was 678,000,000 tons, or 6.45 tons per capita. In a fairly normal year (it is somewhat less just now) the annual coal production is about 500,000,000 tons. The railroads furnish the transportation for 95 per cent of this. It constitutes 37 per cent of railroad freight revenue tonnage, and 17 per cent of freight revenue. The railroads burn about 25 per cent of the coal and also use about one-third of all of the fuel oil that is produced—in round numbers 70,000,000 barrels per year. This, equated to coal, is equal to 20,000,000 tons more, or a total fuel consumption of about 145,000,000 tons. If we estimate a cost of $2.50 per ton, including a reasonable cost for haul on user's rail, we have an annual fuel bill of $362,500,000. It is obvious therefore, that even a small percentage of reduction where it can practically be made, is well worth while.

The coal required to move 1,000 g. t. one mile in freight service, including the weight of the locomotive and tender was, on Class I railroads in the year 1924, 149 lb.; in 1933, 121 lb.; a reduction of 18.8 per cent. The train load in that period, exclusive of the weight of the engine and tender, was: 1924, 1,588 tons; 1933, 1,742 tons, or an increase of 9.7 per cent. Many things have contributed to this result. Of course importance is the improvement of the railroad machine as a whole; not for the sole purpose of saving fuel, although that also was considered, no doubt, but for the purpose of improving transportation generally. Among these factors was the large investment in more modern locomotives, with the retirement of, or modernizing of older tyes, the application of well known fuel-saving devices and many other things with which you are familiar. The fact, however, that with a little less than 10 per cent increase in train load, a 19 per cent reduction was made in unit fuel consumption in freight service, indicates clearly that the effort on the part of the railroads to secure better use of fuel was also a factor. While the figures quoted are for freight service only, equal progress was made in both passenger and switch service, and in the use of fuel in power plants.

Mr. Collett pointed out that a good engine crew working together is the best fuel economy device ever placed on a locomotive, and told the superintendents that in seeing to it that each locomotive is equipped with this "device" they, as supervisory operating officials, play a most important part.

D. L. Forsythe, general road foreman of equipment of the Frisco, supplemented Mr. Collett's remarks from the standpoint of operating practice and, among other things, stated that increased speed of trains has relatively little or no effect in increasing fuel consumption.

R. Tom Sawyer, representative of the American Locomotive Company, briefly reviewed the points of superiority of the Diesel locomotive in certain services, and illustrated some of the more recent developments in this type of locomotive by means of slides. He quoted the following advantages for this type of locomotive:

The Diesel locomotive has the high thermal efficiency of the Diesel engine which is 30 per cent, whereas the steam engine is scarcely 7 per cent efficient. It operates at a fuel cost of one-third to one-sixth that of an equivalent locomotive. It has no stand-by losses. Its availability for service is about 90 per cent. It does not require coaling plants and ash pits. Cost of maintenance is only a fraction of an equivalent steam locomotive. It has all its weight on driving wheels with a uniform torque. It is reliable and instant starting. It has many of the advantages, but without the initial high cost of electrification. It has high starting tractive force, an excellent characteristic for starting heavy trains and on steep grades. Two or more Diesel locomotives can be operated from one control with a single man with multiple-unit control. Quick acceleration is possible because the whole power of the engine is available in starting. Stops for fuel are greatly decreased and stops for water are eliminated. Big economies are assured even on short light traffic runs because of low fuel and operating costs. Safe, convenient controls make handling of Diesel locomotives a simple matter. It can take the place of any motive power without change of personnel or mechanical equipment. The hood type provides unusual visibility from the cab in either direction without sacrificing accessibility, and can provide for operating from either side of the locomotive. The Diesel locomotive is not only quiet in operation, but does not produce any smoke, therefore, being entirely suitable for operation on city streets or residential sections.

Part II, containing the committee reports and their discussion, will follow in next week's issue.

What Constitutes a Reportable Injury?

THE very low employee accident records of some railways have raised the question from time to time as to whether there was suppression of reports or evasion of the Interstate Commerce Commission's rules governing the reporting of accidents. In addition, there have occasionally been specific cases where local supervisors competing with others for low records have resorted to subterfuges in contending that injured men were not incapacitated from work when they actually were. Because of these circumstances, the Safety section of the American Railway Association appointed a committee to develop a means for securing a greater degree of uniformity in the interpretation of I. C. C. reporting rules. In its study, this committee concluded that there is no necessity for adding new or eliminating old rules and that there is no need of corroborative figures on the number of amputations of hands and feet, the number of broken backs, etc., to check upon the casualty rate per million man-hours if all of the rail-

roads would interpret the present rules uniformly and follow them scrupulously.

As a result of the study made by this committee, the Bureau of Statistics of the Interstate Commerce Commission has issued a bulletin entitled "Interpretations of Rules Governing Monthly Reports of Railway Accidents," to bring about greater uniformity in reporting accidents to the commission. The interpretations summarize in general terms the numerous decisions on doubtful cases, but at the same time follow to a great extent the report of the special committee of the Safety section.

The report defines a reportable accident as an accident arising from the operation of a railway that results in one or more of the following circumstances:

(a) Damage to railway property amounting to more than $150, including the expense of clearing wreck, but not damage to or loss of freight or baggage, animals, or property of non-carriers on or adjacent to right of way.

(b) Death of a person.

(c) Injury to an employee sufficient to incapacitate him from performing his ordinary duties for more than three days in the aggregate during the 10 days immediately following the accident. This rule applies to employees on duty, and to those classed as not on duty, but does not apply to employees classed as passengers or trespassers.

(d) Injury to a person other than an employee if the injury is sufficient, in the opinion of the reporting officer, to incapacitate the injured person from following his customary vocation or mode of life for a period of more than one day. This rule applies also to employees classed as passengers or trespassers.

Death of a Person

Death from natural causes is not reportable as a railway accident, but death of a person involved in an accident must be reported as rising in connection with the accident if there is substantial and clinical evidence that such person received bodily injury.

A death resulting from an accident within 24 hr. following its occurrence is reportable as a fatality and will be recorded in the accident statistics of the Interstate Commerce Commission as a person killed.

An Injury Defined

Among the most enlightening portions of the interpretations is that pertaining to injury. That section in detail is as follows:

Any physical impairment of or damage to the body resulting from a specific accidental occurrence constitutes an injury and is reportable under the same conditions as govern the reporting of other accidents. The cumulative effect of repeated or continuous exposure is not regarded as a reportable injury. Thus a blister, infection or lameness developing from continued chafing or manipulation of a tool over a period of time should not be classified as an injury nor reported as such. However, incapacity resulting from exposure to gas or smoke fumes is regarded as a reportable accident.

Freezing, sunburn, sunstroke, heat prostration, dizziness or fainting are not considered accidental injuries, but if a person so afflicted should fall, or strike or be struck by anything as a result of such affliction, any physical damage thus received must be considered an accidental injury.

An initial case of hernia resulting from a blow or from the strain of violent effort and developing immediately thereafter is reportable as an injury. Hernia developing gradually and not definitely connected with exertion at a specific time and place should not be classified as an injury. Recurrence of hernia is not regarded as reportable.

Irritation resulting from repeated or continuous exposure to heat, or contact with chemicals, such as creosote and cleaning compounds, does not constitute accidental injury; but the accidental splashing, immersion or specific contact resulting in a burn or corrosion of the skin is considered an accidental injury.

A sprain or strain of any part of the body is reportable as an injury if it becomes apparent immediately from a specific occurrence in the nature of a sudden and unexpected mishap at a definite time and place. The fact that the injured person may not have normal health does not affect reportability as an injury if the sprain or strain is received under the conditions described.

Reportability of an injury is not avoided from the fact that a contributing factor may have been some physical impairment of the injured person, such as defective vision or hearing, crippled or artificial limbs, diseased condition, susceptibility to dislocation of joints or displacement of cartilage, etc.

The term "employee" applies to any person engaged in the operation of a railway who receives wages or salary directly from the carrier for his services. A person receiving no wage or salary from a carrier but who is remunerated by fees, commissions, bonuses, or merely nominal amounts, is not to be classified as an employee.

A person who performs services both for the railway and for another person or corporation, such as a joint baggage and express handler, but who is carried exclusively on the payroll of such other employer, is not to be classified as a railway employee, even though the railway may by agreement reimburse the direct employer for part or all of his services. Such a person, if carried exclusively on the payroll of the railway under similar arrangements, is to be considered a railway employee at all times for accident-reporting purposes.

A person who performs joint service and is paid directly both by the railway and another employer for their respective proportions of such service should be considered an employee of the railway only when engaged in that part of his duties for which he receives pay from the railway. In doubtful cases, request should be made for a ruling.

Station porters (red caps) carried on the payroll of the railway at a substantial wage or salary should be classified as railway employees. Such persons receiving nominal or no compensation should be classified as non-trespassers.

A person employed only for an emergency job, or intermittently as need for his services may arise, must be classed as an employee if injured during a period for which he receives compensation.

A person who contracts to perform occasional service, such as carrying mail between a depot and a post office at stated times, and caretaking of non-agency depots, shelters, parkways, etc., should not be classed as an employee for accident reporting purposes. Such a person should be classified as an "other non-trespasser."

When reporting an accident occurring to an employee of another carrier, the class of person should be determined in the same manner as if the person were an employee of the reporting carrier.

"On Duty" Defined

The phrase "on duty" applies to an employee on railway premises (or on industrial or private premises while actually engaged in train or switching operations) throughout his designated work period, from the beginning moment to the ending moment of his shift, trick or

(*Continued on page 957*)

Signaling Eliminates "Bottle Neck"

Congestion on 14-mile double-track section in four-track line relieved by rehabilitating automatic block system

TO provide increased capacity on a two-track section between four-track lines, the Erie has installed searchlight-type automatic signals, using four aspects, to replace old semaphore signaling between Suffern, N. Y., and Newburgh Junction, a distance of 14 miles. This section lies between Jersey City, N. J., and Port Jervis, N. Y., with four main tracks extending eastward from Suffern to Jersey City, 31 miles, and westward from Newburgh Junction to Graham, and with three tracks beyond that point for 7.6 miles to Port Jervis. Between Suffern and Newburgh Junction the line follows the Ramapo River through a mountainous territory which would involve a heavy expenditure for the construction of additional tracks.

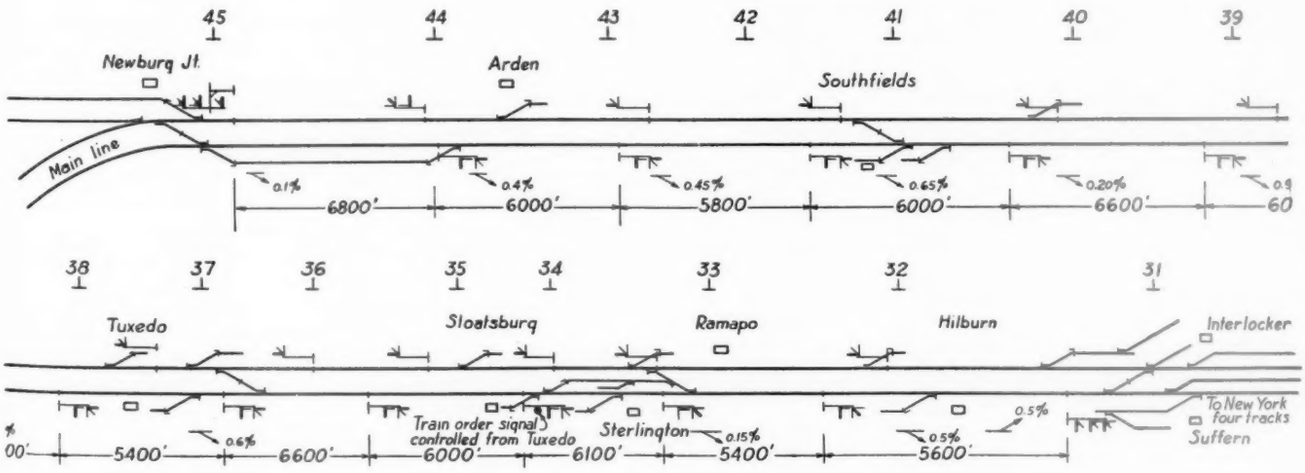
The problem of handling 18 passenger trains and 12 freight trains each way daily over this section of double track is complicated by the fact that the trains are bunched in certain periods, as, for example, between 6 and 8 a. m., when six passenger trains and two freight trains are scheduled eastbound. The grade in this territory is another obstacle, descending eastward at rates varying from 0.04 per cent to 1.14 per cent with an average rate of 0.32 per cent. This grade increases the stopping distance of heavy fast trains to such an extent that they could not be spaced closely with the old signaling arrangement. In view of the fact that three and four main tracks were available on the remainder of the division, this 14-mile section of double track was a "bottle neck."



Two-arm Automatic Signal with Position-light Train-Order Unit

In order to increase the track capacity and improve the safety of train operation on this section of double track, it was decided to replace the old semaphore signaling with new color-light signaling located on an entirely new arrangement. The old signaling was of the lower-quadrant semaphore type, installed in 1909. Each automatic block was about two miles long, with a distant signal 2,800 ft. in the approach to each home signal. With this arrangement, following trains could not be spaced closer than 2.5 miles, and, even with this minimum spacing, there was not proper stopping distance on the descending grade on the eastward track.

The solution devised for this situation was to locate the new eastward signals to afford blocks 5,800 ft. long and to use signals with two units, displaying four aspects to indicate track occupancy three blocks in approach. These aspects are in accordance with the standard code; being red over red staggered for "stop and proceed"; yellow over red for "approach"; yellow over green for "approach medium"; and green over red for



Track and Signal Plan of the 14-Mile Section Suffern to Newburgh Junction

"clear." This system of automatic block signaling not only allows adequate stopping distance with minimum spacing between following trains but affords the engineman of a freight train adequate warning to control the speed of his train in conformance with the signal indications, so as to keep his train moving with safety and yet eliminate unnecessary stops.

The signaling for the westward track, which is on an ascending grade, is somewhat different. In this case the stopping distance is short, so that four-aspect signaling is not required, and single-unit signals, displaying three aspects, red, yellow and green, are used. Likewise, the layout and number of trains operated in any period permitted the use of blocks about 6,000 ft. long on this track. In order to reduce the number of stops for freight trains, those automatic signals on the westward track which are located on an ascending grade of more than 0.3 per cent are equipped with a 15-in. circular yelow disk known as a grade mark, which authorizes the engineman of a freight train to proceed past such a signal at slow speed without stopping in case the signal is displaying red.

So far, the new signaling arrangement has permitted the present traffic of 60 trains daily to be handled without delays and is, therefore, highly satisfactory. However, with a view to future increased traffic, the new signals were so located as to fit in with a centralized traffic control involving either-direction operation on each track. In such a proposed improvement a set of two crossovers would be located at Tuxedo, midway between the two ends of the double track, so as to make it possible to direct trains from one track to the other when making run-around movements.

Details of Construction

This 14-mile double-track signaling installation involves 12 two-unit signals on the eastward track, and 11 single-unit signals and 1 two-unit signal on the westward track. The automatic block signals are of the searchlight color-light type, mounted on masts at the right of the track governed, excepting where signal bridges are required. The single-unit signals, as well as the bottom unit of double-unit signals, are 12 ft. 2 in. above the top of the rail, the upper unit being 6 ft. above the bottom one. This height of mounting was used to bring the signal as nearly as possible in line with the engineman in the cab of a locomotive, and this feature has proved to be of benefit during foggy weather.

An interesting feature of the signaling on the Erie is the use of remotely controlled three-aspect telephone train-order signals at outlying passing tracks. On such signals, a horizontal aspect directs the train to stop on the main track and call the dispatcher; a 45-degree aspect directs the train to stop, pull into the siding and report when clear of the main track; while a vertical aspect indicates that the train is to proceed on the main track regardless of following superior trains. On previous installations, a semaphore or a color-light signal has been used to display these telephone train order signal aspects. However, in the new Suffern-to-Newburgh Junction installation a position-light signal was used for the first time for the train order signal, this position-light unit being mounted below the other signal units, as shown in the illustration on the preceding page.

The design and construction of this automatic signaling installation was handled by the signal department forces of the Erie, the signals, relays, etc., being furnished by the Union Switch & Signal Company.

Mexican Operating Men Hold Annual Convention

WITH an attendance of 130 members and numerous guests, the sixth annual convention of the Mexican Association of Railroad Officials met in Mexico City on May 21, and was greeted by Mariano Cabrera, executive president of the National Railways of Mexico.

A great deal of time was taken at this convention in discussing highway competition, which, although somewhat later in reaching Mexico than the United States, has in the past few years made great inroads in the revenues of the Mexican railways. The situation in regard to highway competition in the United States, together with measures taken by the United States railroads to counteract this competition, were gone into in great detail. While there is no Interstate Commerce Commission in Mexico, the situation as regard to the railways being under definite and even rigid control while their highway competitors are uncontrolled, has its parallel in Mexico in view of the fact that the Mexican railways are subjected to federal regulation under the law of communications, which covers the granting of concessions, inspection of construction and maintenance materials, timetables, tariffs, and rules in general. Thus the Mexican railways are subjected to control as are those in the United States and they are also heavily taxed.

Motor competition in Mexico is not subject to governmental control and has no regulation other than the private interests of the car owners or drivers, who charge whatever rates they please, have no requirements as to the publishing of timetables and tariffs or the keeping of an adequate accounting and whose taxes are entirely out of proportion, considering the use that they make of the highways. Highway competition is particularly acute in Mexico City and its surrounding districts, as well as between such centers as Laredo and Monterrey, Saltillo and Victoria. Passenger traffic on the railways between these points has suffered acutely and, while there are no exact statistics available as to the loss to the railways through trucking of freight, there is no doubt but that such losses are considerable.

Meeting Highway Competition

In addition to general proposals to equalize taxation and regulation as between the railways and the highways, specific proposals were made to meet highway competition. Included among these was a revision of the present ticket issuing and validation system to simplify matters for passengers. Station agents are to be authorized and financially helped in the establishment, on their own account, of bus and truck feeder service to the railroads, with the understanding that they will not operate highway service competing with the railways. A committee of four was appointed to study and determine the type of rail motor car most suitable for operation in competition with motor coaches on the highways and during the discussion it was mentioned that the vice-president of the National Railways of Mexico is already in touch with American manufacturers for the purchase of such motor cars.

Maintenance Matters Considered

A campaign of education among section foremen as to proper track drainage was recommended by the committee on maintenance. It was devoloped that in most instances the foremen simply make repairs to track that goes out of line and surface because of bad drainage with-

out correcting the cause, resulting in frequent recurrences of the same difficulty. After considering the proper maintenance of embankments and the handling of ties, the committee recommended the establishment of extra gangs consisting largely of skilled personnel to study the different problems in detail on the ground and to make estimates and establish practical and economical working methods. It was further recommended that such gangs be mechanized and provided with excavators, gasoline shovels, tractors, disc plows, self-dumping gondolas, air compressors, drilling equipment, etc. In addition, it was recommended that portable stone crushing plants be distributed at various points along the railroad to replace worn out ballast and this suggestion having been approved, a committee was appointed to study the type of crushers suitable to the needs of the Mexican railways.

Lubricating Problems Studied

The report of the committee appointed to consider this subject showed that the system employed at present for handling lubricating materials is unsatisfactory, there being no modern oil-handing stations available. Lubricating materials are kept in ordinary warehouses with practically no facilities to insure proper handling, resulting in unnecessary waste brought about by mixture with foreign materials and other classes of grease and oil. It was recommended that modern storage tanks equipped with all mechanical devices for the reception, storage and issuance of oil be built, and a recommendation was transmitted to the railway administration to approve the project of constructing such stations at least at Mexico City and Monterrey, together with appropriate oil houses at other places along the line.

By the acquisition of modern machinery for washing "dope" and for reclaiming the oil and recovering it, together with the proper reclamation of packing materials and a new system of handling, it was estimated the lubricating costs could probably be cut 60 to 75 per cent.

In view of the present rather unsatisfactory system for locomotive lubrication the committee suggested that tests be held of various forms of locomotive lubricators to see which were best adapted to Mexican conditions.

The committee closed its report with the suggestion that a determined effort and studied campaign be inaugurated for the purpose of educating enginemen not only as to proper lubrication but also as to the importance of saving fuel, both oil and coal. An outline of a plan similar to some of those in use in this country was given with the recommendation that it be adopted for the Mexican lines.

Operating Problems

J. J. Franco, general superintendent of the National Railways of Mexico, and former president of the American Association of Railroad Superintendents, as committee chairman, presented an elaborate report on the avoidance of unnecessary train stops. The committee recommended that particular attention be given to the location of water and fuel stations, both with relation to each other and with relation to the existing passenger stations. The relocation of some of the water and fuel plants was held as necessary to avoid unnecessary train stops. A revision of the method of delivery of train orders, together with an overhauling of the time-tables to put them more in agreement with actual operating conditions, was also recommended. Extensions of telephone dispatching, the application of radio communication between engine and caboose, and an increase in the mileage protected by signals were held as important in eliminating such delays as are at present experienced.

It was also revealed by the report that an efficient and continuing campaign looking toward the more prompt handling of both carload and l. c. l. freight is in progress on the Mexican railways. This problem, it was felt, rests squarely upon the shoulders of the transportation officers, whose duty it is to educate all concerned in the handling of freight as to modern methods of freight handling and avoiding delay in terminals.

Expediting Correspondence

The Spanish language is particularly rich in expressions of politeness and this is especially true in letter writing in Spanish. That such expressions have little place in the modern business world was the considered opinion of the committee appointed to consider expediting correspondence. The committee recommended that unnecessary phrases be omitted from letters in the future and that the letters should be shortened; brevity and simple phraseology to be the prime considerations. The present practice of making and distributing a number of useless carbon copies was frowned upon and recommendations as to uniformity of forms, expressions and contents of letters were made, together with the need of uniform filing systems throughout the offices of the railway so that the dictation, handling, distribution and delivery of correspondence be made more efficient within the railroad organization, resulting in a considerable saving of time and expense.

The final address was delivered by Nicolas Procel (operating vice-president of the National Railways of Mexico), the retiring president. Officers elected for the ensuing year were as follows: President, J. J. Franco; vice-president, P. C. Morales; and secretary-treasurer, A. del Paso, general superintendent, superintendent of machinery and motive power and maintenance of way engineer, respectively, of the National Railways of Mexico, and Mexico City was again selected as the meeting place for the seventh annual convention, to be held next year.

What Constitutes a Reportable Injury?

(*Continued from page 954*)

tour of duty, unless he has been definitely relieved from the performance of any and all service for a definite time, or has wilfully left the vicinity of his customary post of duty contrary to accepted or tolerated practice; in either of the last mentioned circumstances he should be classified as an employee not on duty, or under unusual circumstances as a trespasser. Brief absences to get a drink, go to a toilet, "get a breath of air," etc., are not to be considered wilful absence from post of duty.

An employee coming to work is not on duty until he reaches the point where he customarily reports, checks in, registers or otherwise assumes duty, (yard office, enginehouse office, shop office, tool house or similar point). An employee at the close of work is not on duty after leaving the point where he customarily reports, checks in, registers or otherwise assumes duty. An employee is not on duty unless he is actually under pay.

An employee whose presence on a train is primarily in connection with his ordinary duties must be classified as an employee on duty, regardless of where he is riding.

An employee whose presence on a train is not primar-

ily in connection with his ordinary duties, but for the purpose of travel, must be classified as a passenger when riding in that part of the train assigned to the use of passengers. When riding in that part of a train not assigned to the use of passengers, he must be classified as an employee not on duty.

An employee deadheading on mail, freight or express trains with no provision for passengers and riding to and from work on an employee train is to be classified as an employee not on duty.

A railway employee on the premises of the carrier can be properly classified as a trespasser under very limited conditions.

Sufficient to Incapacitate

The phrase "sufficient to incapacitate" means sufficient to prevent a person from doing his usual work, by reason of possible future consequences or because of pain or limitation of function, whether such pain or limitation results from the injury, subsequent infection or from the bandaging or treatment. If a trivial injury develops infection sufficiently severe to prevent performance of usual work, that injury must be regarded as "sufficient to incapacitate."

Performing His Ordinary Duties

The phrase "performing his ordinary duties" is interpreted to mean performing fully and acceptably and without extra assistance all the duties customarily included in the regular assignment of the employee at the time of injury.

Generally speaking, any injury which, if it occurred off duty, would be regarded as necessarily incapacitating an employee from performing his regular work, should be likewise considered as incapacitating him when the accident occurs on duty. Excepting only those persons whose entire duties consist of desk work or supervision, no employee should be considered able to perform his ordinary duties if he has a foot or a leg in a cast or splint, a hand or an arm in a cast, splint or sling, or has to use crutches or be assisted in getting about.

The best and most acceptable evidence that a person who has sustained an injury is able to perform his ordinary duties is that he continues to do his usual work and performs those duties throughout his regular working periods without disability amounting to more than 3 days during the 10 days following such injury. Failure to resume work must be regarded as evidence that he is unable to do so, unless a physician after an examination of the injured person, makes a written statement that in his opinion such a person is actually able to perform his ordinary duties without seriously jeopardizing his recovery, or the person himself decides he is able to resume service and reports for duty. Doubtful or disputed cases should be submitted for a ruling.

Three Days Following the Accident

For the purpose of computing the period of incapacity, to determine whether or not it exceeds three days, it is necessary to determine when disability begins and when it ceases and to include all intervening days, regardless of payment for time during which the employee is unable to perform service. Holidays, Sundays and lay off days should be included. For this purpose the following interpretation is made:

(a) Disability begins whenever the pain or inconvenience resulting from his injury becomes so serious that it would prevent the injured person from performing his ordinary duties, whether or not there is necessity or opportunity for him to do so at the time the disability begins.

(b) Disability ends whenever the injured person has recovered sufficiently to be able to resume performance of his ordinary duties whether or not there is opportunity for him to do so.

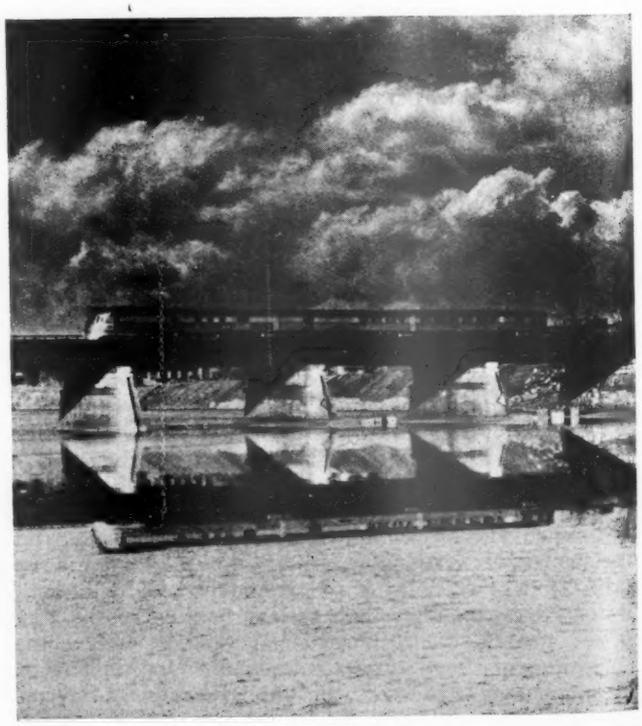
In most cases disability begins at the time of the accident and ends with the return to work, but in some cases it may become apparent only after quitting work, as when a sprain becomes painful or infection develops. Also, incapacity may end even if the person remains off duty for reasons not dependent on the injury. In such cases the evidence to this effect should be clear.

If an injured employee, who has resumed regular duties, is required to be absent for short periods to receive treatment or dressing of his injury, such periods of absence for that purpose should not be counted as periods of incapacity. Such absences, however, must be restricted to the minimum time necessary to go and return and in no case should it include a major portion of his regular turn, shift or tour of duty.

An employee who returns to duty after absence caused by injury and is further incapacitated because of the effects of such injury must be considered as incapacitated from the beginning of such time until he is again able to resume work. If the total of such periods of incapacity within the 10 days after the occurrence of an accident amounts to more than 72 hr. in the aggregate, the accident is reportable.

Thus, the phrase "more than three days in the aggregate" is interpreted as meaning more than 72 hr. in the aggregate, including all hours of incapacity, whether they are hours of regular tour or assignment, or hours of ordinary rest and recreation. Periods of incapacity during nights, Sundays and holidays, or any other time within the 10-day limitation, must be counted. The phrase "during the 10 days immediately following the accident" means the 240 consecutive hours immediately following the moment the accident occurs.

* * *



The Burlington "Zephyr" Crossing the Mohawk River as It was Leaving Schenectady, N. Y., One of the Cities Visited During Its Recent Exhibition Tour of the East

Ten Years' Locomotive Development Unutilized

Expedited freight service demands more horsepower—New attitude toward passenger service changes future outlook of passenger power

CHANGES in locomotive proportions, which were a marked step in the evolution of the freight locomotive from a low-speed traction device to a producer of high horsepower and a high-speed traction device, were introduced about 10 years ago. Because of the declining rate at which motive power has been purchased since that time the extent to which these developments have been incorporated in the locomotive inventory of the railroads is no greater than might have been effected within a two or three-year period under a reasonable replacement policy.

The largest single type of locomotives owned by the Class I railroads are the Consolidations which number 11,266—over one-fourth of the total road locomotive inventory—and average almost 26 years of age. Of the wholly modern types of power—those with four-wheel trailers—which have been built during the past ten years, there are 1,046 in service, and not all of these are freight locomotives.

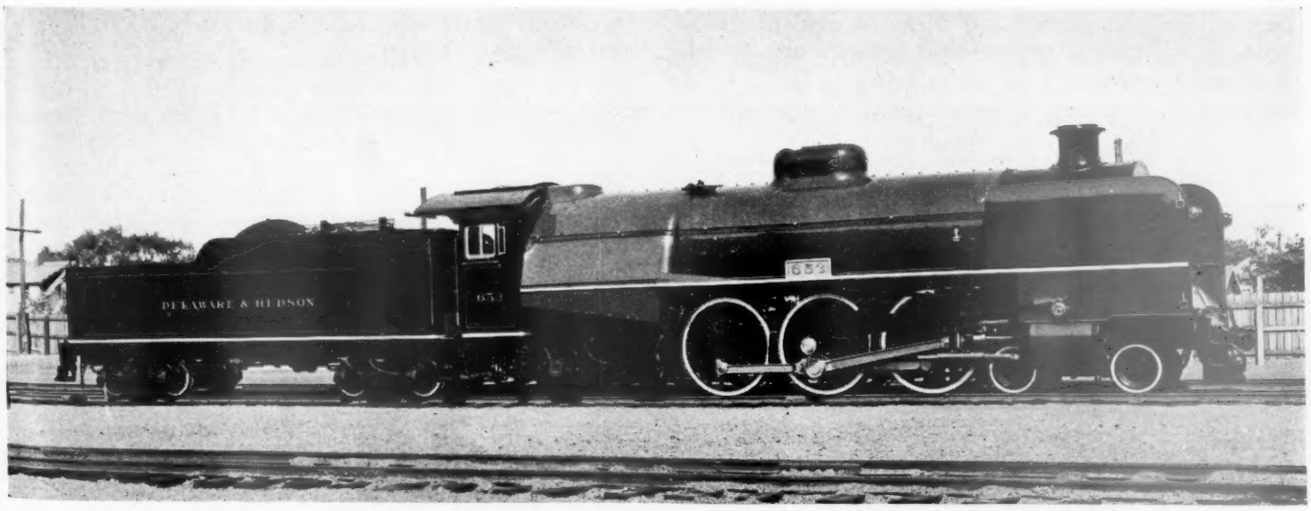
The study of repair costs made by Co-ordinator Eastman's Section of Car Pooling clearly establishes the fact that the unit cost of locomotive repairs increases definitely with advancing age. While this factor alone does not offer a complete basis on which to determine the economic life of locomotives, since it takes no account of the effect of improvements in locomotive design and construction on the cost of conducting transportation, the rate at which repair costs increase is alone sufficient to indicate clearly that a continuance of the present lack of policy with respect to obsolete equipment is wasteful.

Economic Value of Old Locomotives Questionable

The average age of the locomotives for which data were collected in the Co-ordinator's repair-cost study was 18.89 years. This implies an average life at retirement of about 38 years. The average age-of-use was 13.87 years. What would have been the effect on the cost of maintenance at present of an inventory in which retirements had been made at the age of 20 years and in which the average age of the locomotives now would be about 10 years? Assuming about the same relationship of age-of-use to average age of the locomotives owned, as obtains in the present inventory, the average age-of-use would now be 7.3 years. The average repair cost per horsepower unit of all the locomotives studied is $1.16 at age 13.87 years and 96 cents at 7.3 years, a difference of 20 cents per horsepower unit. On the basis of the average expenditure for locomotive repairs during the three-year period covered by the study, this is equivalent to a reduction of about $72,000,000 a year. To maintain the age conditions by which this reduction in repairs is effected would require approximately doubling the annual charges to depreciation. This would take an average of about $57,000,000 as of the years 1927, 1928 and 1929, leaving some $15,000,000 as a net reduction in total direct charges to locomotive maintenance. For the three years in question these charges—including repairs, depreciation and retirements—averaged about $479,000,000, of which the net saving is approximately three per cent.

Obviously, such figures are of little value as a basis of procedure by any railroad in the development of a general policy with respect to its motive power. They do indicate, however, the fact that the saving in locomotive maintenance alone is sufficient to justify a careful study of the economic value of every locomotive over 20 years old and, no doubt, of some of less than that age.

There has been a steady trend toward expedited freight service throughout the past 10 years. Average freight-train speeds have steadily increased, first with



Delaware & Hudson High-Speed 4-6-2 Type Passenger Locomotive with Front Side Plates to Carry up Smoke Clear of Cab and Train—325 lb. Steam Pressure, Poppet Valves, Roller Bearings for Main and Side Rods

a reduction of delays and then by increased running speeds. To meet the latter condition locomotive horsepower—not tractive force alone—is required. The characteristics of modern freight locomotives, so few of which have as yet been placed in service, meet this trend in the requirements, and for this service large groups of existing freight locomotives are inadequate.

With a few notable exceptions, there has been little change in the passenger motive power owned by the railroads during the past 10 years. During this period the growing use of the rail motor car for local service, both on branch and main lines, reduced the volume of steam-train mileage and, generally speaking, there have been no changes in through service requiring increases in the number of locomotives for this class of service.

Light Cars and Locomotives on Long Runs

The present indications with respect to the development of passenger equipment point to a gradual reduction in passenger-train weight, with an ultimate place for lighter locomotives designed to operate on schedules averaging higher speeds than those of present long-distance runs. Where trains are short, self-propelled cars or train units offer advantages of weight and operating economy. As trains increase in length, however, the advantage in these respects becomes proportionately less and flexibility strongly favors the separate motive-power unit.

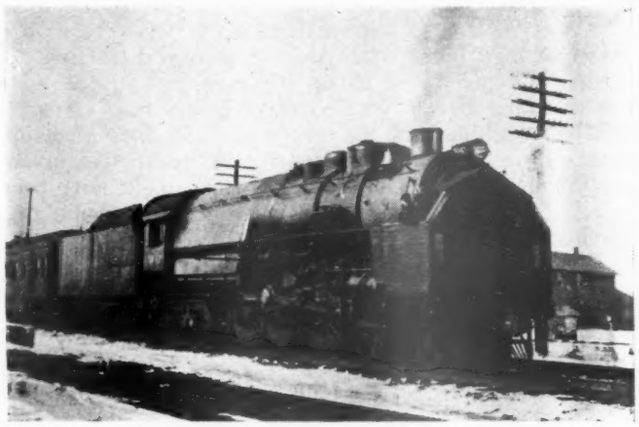
There is no lack of evidence that some of the present steam locomotives are capable of top speeds of 100 miles an hour and many of them are frequently required to reach 80 miles an hour. With reductions in the weights of passenger-train cars higher horsepower per ton may be obtained without exceeding present locomotive capacities. An increase in horsepower per ton facilitates higher operating schedules within a given top speed. Streamlining of the steam locomotive to reduce air resistance offers no inherent difficulty and will materially increase drawbar horsepower at high speeds.

A New Competitor

The steam locomotive is facing a new competitor in the form of Diesel motive power, just as 30 years ago it faced the competition of electric traction. The advent of the internal combustion power plant for railway service has provided a highly useful facility. In the form of self-propelled cars the Diesel power plant is admirably adapted for certain light and relatively inflexible train services. The high acceleration of the Diesel locomotive at low speeds makes it particularly suitable for switching and transfer service and it can be used in any service for which units of sufficient capacity are available, if the use is sufficiently continuous to insure that fixed charges per unit of service shall not offset operating advantages. But for the bulk of the service, which provides a relatively low use factor owing to the spacing of schedules and seasonal fluctuations in the volume of traffic, the relatively low first cost of the steam locomotive is a factor of great weight, in keeping it as the center of the motive-power inventory of the railroads.

Development Continues

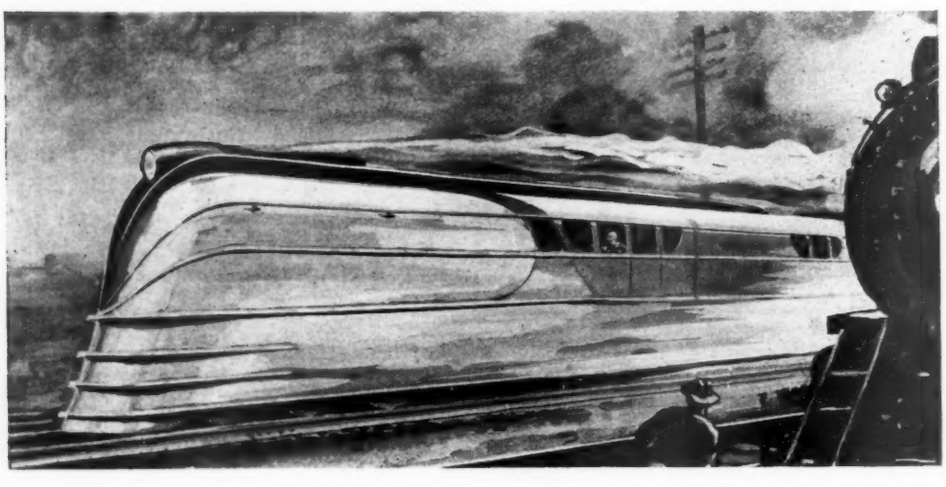
Unlike the case of passenger cars and freight cars, the present moment does not mark the beginning of a new epoch in the evolution of the steam locomotive. It was subjected to a period of intensive development following the close of the war, culminating in the introduction of the four-wheel trailing truck, which removed the limitations on firebox proportions then imposed by the single-axle trailer, and increases in boiler pressures.



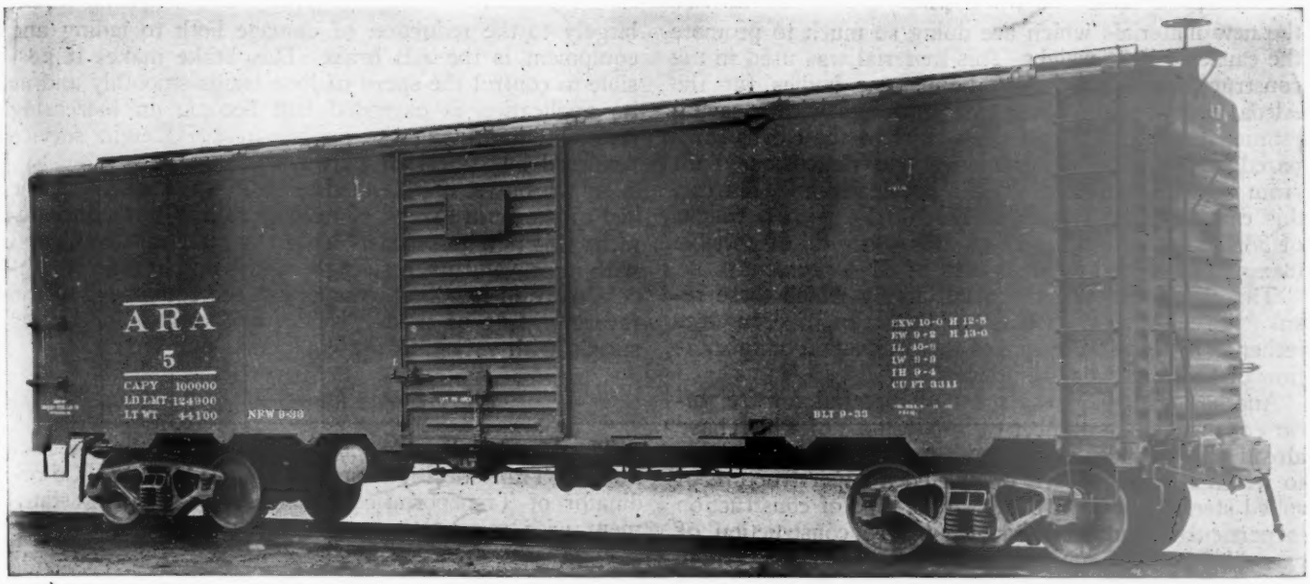
Photograph by Roy W. Carlson

B. & O. Latest High-Pressure High-Speed 4-6-4 Type Locomotive No. 5047 on a Test Run—350 Lb. Pressure, Emerson Water-Tube Firebox

Developments have not ceased, however. Water-tube fireboxes, to carry boiler pressures as much higher than the 275 lb. to 300 lb., which mark the limit for use with fireboxes of staybolt construction as may be desired, have established themselves to a limited extent. Poppet valves are also receiving attention and have a promising field in connection with the trend toward higher speeds. The adaptation of the steam locomotive for use with light-weight passenger equipment in high-speed service is already under way and it will soon be taking its place in this class of service.



The Future May Bring Steam Locomotives Like This



A.R.A. Standard Steel-Sheathed Wood-Lined Box Car Which Saves 3,500 lb. Weight

New Materials Change Outlook for Freight-Car Construction

Together with changing service requirements, they promise a rapid evolution as the depression disappears

EVOLUTION, at least so far as its visible elements are concerned, never proceeds at a uniform rate. The advent of steel as a material for car construction in 1898 caused a sudden change in the future prospects of rolling stock of wood construction and the car-building industry was busy for more than twenty years in re-equipping American railroads. During this time refinements in the art of utilizing steel as a material for car construction were made and as these became less and less major factors of design, more and more attention was devoted to the development of uniformity of design by the standardization work of the Mechanical Division of the American Railway Association.

But the time came when the task of re-equipping the railways with the kind of cars introduced in 1898 was completed and nothing was in sight to indicate that such designs might not be perpetuated indefinitely.

Now, as at the turn of the century, the key to the future of railway car construction again is to be found in new materials which are changing the entire outlook as to prospective life and usefulness of cars of conventional design.

New Materials Open Up New Possibilities

While, in general, refinements of design have gradually become minor factors in so far as their effect on the general type of car construction is concerned, it should not be inferred that they have ceased to make valuable contributions to the evolution of railway rolling stock. The outstanding recent contribution of this kind is the new standard A.R.A. steel-sheathed, wood-lined box car, in the development of which the skill of the builders was permitted to make its contribution by the Car Construction Committee of the Mechanical Division and in which certain departures were made from existing standards. A saving of approximately 3,500 lb. in weight, without help from new materials, in a box car of much better balanced construction and possessing fewer points of weakness than its predecessors, is the result of that project. There need be little doubt, however, that improvements in construction, both from the standpoint of weight and low maintenance cost, which the skill of the designer will be able to produce with new materials in which durability and the ratio of strength to weight have been increased, will greatly exceed those possible through refinements in designs intended for the use of conventional materials.

One example of the weight-saving possibilities of new materials and a modern feature of freight-car design may be seen in the exhibit at a Century of Progress of a Baltimore & Ohio hopper car, in the construction of which the Duryea cushion underframe and a liberal use of the corrosion-resisting properties of U.S.S. Cor-Ten steel have been combined. This car has a load capacity of 137,000 lb. and a tare weight of 32,000 lb. The lading capacity is within 3,000 lb. of the nominal load-carrying capacity of conventionally built cars carried on trucks with 6-in. by 11-in. axles and yet it does not exceed the load limit of 5½-in. by 10-in. axles. It provides a ratio of paying load to gross load of 81 per cent.

The high-strength aluminum alloys were the first of

the new materials which are doing so much to promote the cause of light weight. This material was used in the construction of ten 70-ton hopper-car bodies for the Alcoa Ore Company over two years ago with a saving estimated at 21,200 lb. in the weight of the car as compared with one of the same general dimensions built from heavier materials. While nominally a 70-ton car, this car has a load limit of 171,100 lb. with a weight of 38,900 lb. on 6-in. by 11-in. axles—a ratio of possible maximum net load to gross load of 81½ per cent.

The choice between the materials by which these results have been obtained is in the realm of economics rather than in the technique of the production or fabrication of the materials themselves.

Another change in the form of material for freight-car construction, a number of applications of which have already been made, is the unit steel-underframe casting to which may be welded or riveted a superstructure of rolled steel shapes and plates. This type of construction is particularly adapted for use in the construction of cars likely to be subjected to severe corrosive action. The surface of the steel casting and its freedom from joints make it particularly free from deterioration by corrosion. Irrespective of the type of service, however, such castings provide a relatively maintenance-free foundation on which to build up a car structure.

From a handy repair facility the autogenous welding processes are rapidly becoming major tools for use in the construction of railway rolling stock. The Kansas City Southern has recently built one hundred 40-ton automobile box cars in which the entire steel superstructure is of welded construction and is welded to the steel underframe casting. While no particular attempt was made in the design of this car to reduce weight, except by the replacement of riveted connections with welding, the car, equipped with an automobile loading device weighing 3,200 lb. and a cast-steel underframe, has a total tare weight of 52,200 lb. As details of design are adapted to the welding process, however, it may be expected to contribute further to weight reduction, and it will also undoubtedly contribute to a reduction in the need for repairs.

Lading Protection

For many years designers of freight cars have been principally occupied with efforts to strengthen the designs of freight cars and of the parts particularly called upon to resist shocks in order that they might successfully withstand rough handling which was constantly growing more severe. Today, much more of the attention of the designers is becoming focused on provisions for softening the severity of shocks which, even though the cars may be built to withstand them, are destructive to the lading. It is for this purpose that the cushion underframe and selective travel draft gears have been developed.

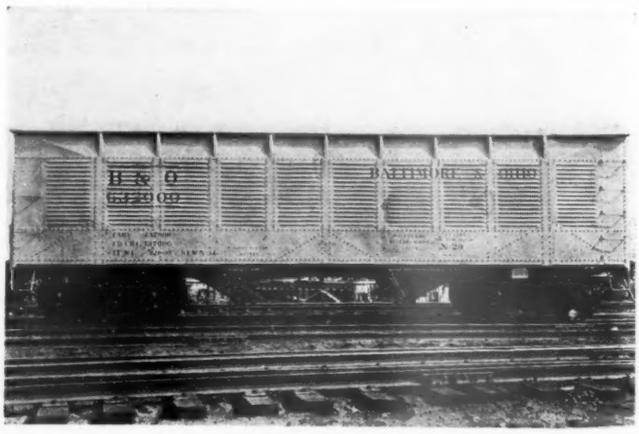
To eliminate the vertical harmonic truck-spring oscillations, the destructiveness of which has been generally appreciated only within the past four or five years, a number of so-called spring damping or snubbing devices have been developed by which the springs are freed from critical oscillation rates at which energy in destructive amounts is alternately stored in and released by the loaded springs. The value of such devices has been demonstrated by investigation conducted by the Car Construction Committee which, in an elaborate series of tests, has found that the destructive vertical oscillations or bouncing can be reduced or practically eliminated by various of these devices, either incorporated in conventional trucks or in special truck designs.

Another factor which will undoubtedly contribute largely to the reduction of damage both to lading and equipment is the AB brake. This brake makes it possible to control the speed of long trains smoothly and as its application is extended will become an increasing factor in improving the quality of the freight service rendered by American railways.

At the outset of this discussion it was stated that the key to the future trend of railway rolling-stock development was new materials. The new materials, combined with improvements in riding qualities and in the smoothness of train handling, insure that the equipment of the future will be of lighter weight and capable of higher speeds with safety to the equipment and lading.

What About Merchandise Cars?

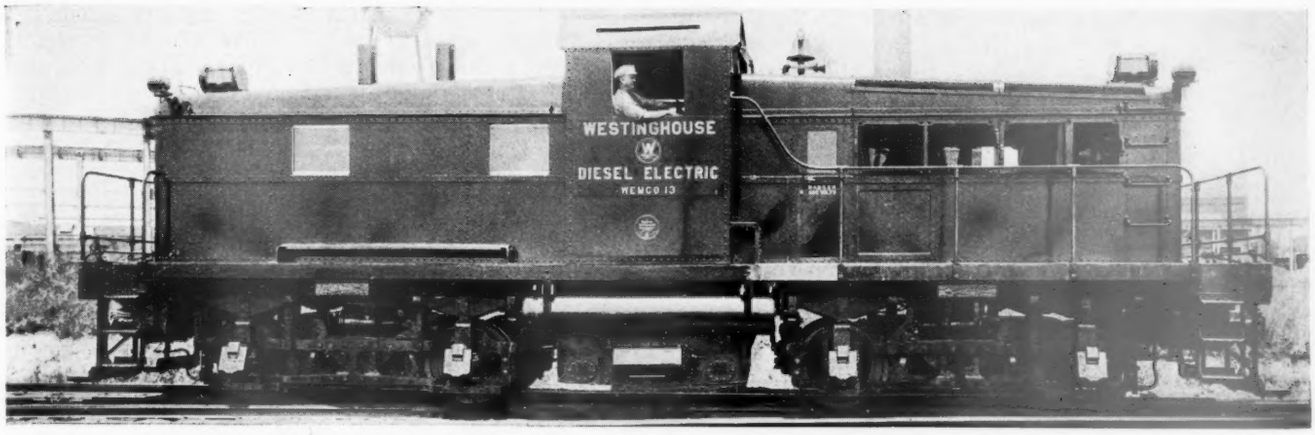
The Merchandise Traffic Report prepared by the Section of Transportation Service of the Federal Co-ordinator of Transportation contains the following statement with respect to equipment: "Rail equipment for the handling of merchandise should be modernized. * * * Temporarily, box cars can be made serviceable for the transportation of merchandise by the installation of non-harmonic springs, improved high-speed trucks and wheels. As the present equipment—express and freight—wears out, it should be replaced with light, shock-proof equipment primarily designed for merchandise service. This equipment should include containers, truck bodies and other units interchangeable between the chassis of rail and the highway vehicles."



B. & O. Light-Weight Hopper Car with Duryea Cushion Underframe

This statement emphasizes the need for types of equipment better suited to the specific needs of merchandise transportation than the box car. Such types of equipment mean complete departures from present standards and will undoubtedly require the addition of several types of equipment to those already in service. What form will ultimately prevail will not be clear until several, perhaps many, types have been tried. A solution of this problem, to be satisfactory from the standpoint of the railroads, as well as in the interests of co-ordinated rail and highway merchandise distribution, must provide for rail and highway interchange without platform handling and it must provide small container or car units. Smaller units ordinarily mean a low ratio of paying load to gross load. The new materials now available will be of assistance in the development of such units within reasonable weight limitations.

New materials and new service requirements for an important part of railway freight traffic promise a rapid evolution in car construction during the next 10 years.



Westinghouse Diesel-Electric Switcher with 800-Hp. 12-Cylinder Engine

Developments in the Use of Diesel Power

Has advantages in certain services—Adaptation to wider field of road service a problem

BEHIND all of the publicity that has been given to such spectacular performances of Diesel powered railway equipment as the recent non-stop run of the Burlington Zephyr from Denver to Chicago at an average speed of 77.5 miles an hour, lies several years of development and research work that has resulted in the adoption of Diesel power by American railroads to an extent not generally recognized.

With the exception of a few comparatively recent installations in rail-car and high-speed, light-weight train services the greater part of the Diesel-powered equipment in railroad service has been in the field of switching. Since 1924, at about which time Diesel-electric locomotives were being introduced in railroad service, there has been a steady increase in the number of locomotives of this type used in railroad work, particularly in switching service, until at the present time there are approximately 150 locomotives, either in service or on order, having an aggregate engine horsepower of over 50,000.

The demands for high-speed passenger trains of considerably less weight than the conventional steam-operated equipment focused the attention of engineers on the possibilities of utilizing Diesel-engined power plants. The Burlington Zephyr is typical of one of the most recent developments of this type of equipment and, while it is the first of the new high-speed, streamlined passenger trains to be equipped with a Diesel power plant, it is only one of several similar installations now under way. The Union Pacific, following its introduction of a light-weight, high-speed, streamlined train, powered with a distillate engine, is now building other streamlined trains which will be Diesel powered. Other roads, notably the New York, New Haven & Hartford and the Boston & Maine, have announced the construction of high speed trains to be Diesel powered.

Because of the fact that the rail-motor car, which has been used extensively in short-haul and branch-line service during recent years, was developed initially around the use of the gasoline power plant, the use of Diesel engines in rail-car service has been comparatively recent and confined to a few units. Notable among these has been a Diesel powered rail car on the Erie, a Diesel powered car on the Seaboard Air Line, and a 600-hp. Diesel-electric rail car built by the Ingersoll-Rand Company and the St. Louis Car Company which has been operated over nine railroads to date.

The Seaboard Air Line car is of particular interest because of the fact that it was originally equipped with a gasoline power plant, for which a Diesel engine was recently substituted, with the result that the operating costs for the first 10,000 miles of service with the Diesel-electric power plant indicate a saving at the rate of $10,-



An Alco 600-Hp. Diesel-Electric Switcher

000 a year for fuel alone as compared with the gasoline power plant. The Ingersoll-Rand car has operated in demonstration and test service on nine railroads, on the lines of which it has made over 22,000 miles hauling from two to five trailers in trains averaging 283 tons. On these runs the power plant was operated with an average total load-factor, with engines running, of 68 per cent, and an average with the car in motion of almost 77 per cent.

The rail-motor car, from the beginning, has been surrounded by certain limitations, primarily dealing with the relation of weight to power. It has not been found desirable nor economical to build gasoline power plants much larger than 300 hp. and, in view of the hazards of the fuel along with its comparatively high cost, it was natural that designers of rail cars should consider the possibility of more powerful engines using a cheaper fuel. This brought the Diesel into the field. Another factor which has had an important bearing on rail-car design has been the tendency of the railroads to insist, until recently, upon building them to specifications along the lines of the heavy conventional rail passenger equipment in order that they might be operated in combination with standard coaches as trailers. Because of this the possibilities of the relatively low-powered gasoline power plants were definitely limited.

Neither the development of high-speed, light-weight, streamlined trains nor the application of Diesel power to such trains has progressed at this time to the point where accurate predictions can be made as to how this type of equipment will ultimately fit into the field of passenger transportation. There is a definite demand for a type of passenger equipment that can be operated at higher speeds but at considerably less cost in order to make it possible for the railroads to handle certain classes of passenger traffic at a profit. In the high-speed, articulated train an answer is being sought to this demand and it has, as well, served as an indication that the railroads have changed some of their ideas which stood in the way of a more rapid development of the rail-motor car, such as the willingness to turn to another form of power plant in order to get higher engine horsepower and to recognize the necessity of eliminating every pound of non-revenue load by utilizing materials and types of car construction new to the railroad industry.

The articulated train, with the power plant a part of the train, has one disadvantage from an operating standpoint in that there is no flexibility as far as the number of car units is concerned, resulting in the necessity of confining these trains to selected runs and not to general use. This immediately gives rise to speculation as to the probability of using Diesel-electric locomotives, either in single units or in combination, as motive power to haul light-weight individual car units in short or long passenger trains as the traffic may require. As a matter of fact, there are in the process of design at the present time several Diesel locomotives of relatively high horsepower capacity.

Before the answer to the Diesel locomotive for road service can be written, there are some highly important economic and engineering factors which must be cosidered. There is a difference of opinion among engineers experienced in Diesel design as to the most desirable engine for service in a rail locomotive. There are those who feel that some of the mechanical difficulties surrounding the construction and operation of engine units much larger than some of those which are now in operation are sufficient to justify hesitancy on the part of the railroads in constructing locomotives utilizing Diesel engines of such horsepower capacity as would approach that of steam locomotives. Then, too, the use of large Diesel power plants of relatively low speeds injects the question of the possible difficulties of generator design because of clearance limitations. There are those who advocate single-unit locomotives with high-powered engines and those who lean toward multiple units with smaller engines. In the case of the former, the possible mechanical and electrical difficulties must be taken into consideration and, in the latter case, the factor of higher initial cost seems extremely important. Then, too, who can say at the present moment whether the ultimately satisfactory power plant will embody a four-cycle or a two-cycle engine?

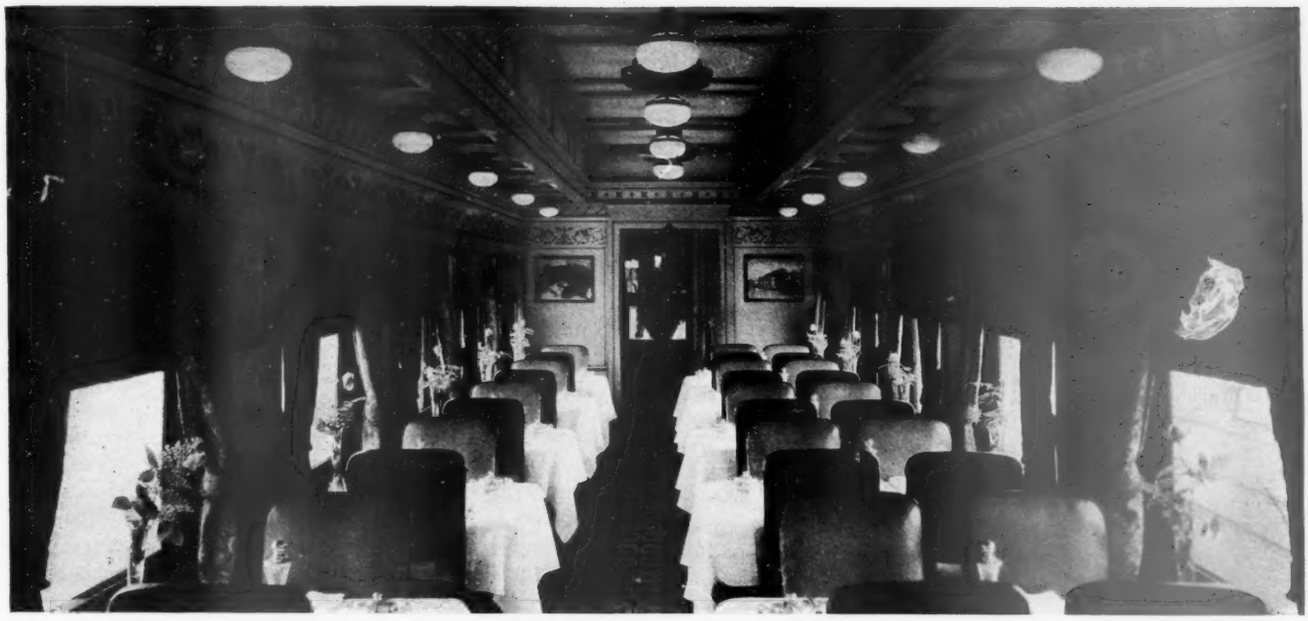
There is little doubt but that Diesel power plants, either in train units or in locomotives, will be introduced into road service. How far will depend on future developments in the art of locomotive building. At the outset the clear field for such installations will be special classes of service where special considerations, such as water conditions or smoke elimination, make the replacement of steam motive power desirable.

Diesel Locomotives in Switching Service

In the field of switching and transfer service the Diesel-electric locomotive offers distinct advantages as compared with the present-day design of steam switching power, and where Diesel-electric switching locomotives can be operated for periods exceeding 16 hours per day, and under some conditions considerably less, there seems now to be no question but that they offer a real opportunity to effect economies in railroad operation.

There has been a steady increase in the number of Diesel-electric locomotives which have been installed in switching service in the United States. Diesel locomotives are now operating in switching service on approximately 20 railroads in this country. The majority of these locomotives are equipped with 300-hp. engines, although quite a number of locomotives equipped with 600-hp. engines are in service. Outstanding among the roads using this type of power in switching service are the New York Central Lines with 42 locomotives; the Delaware, Lackawanna & Western with 20 (some of which are under construction); the Illinois Central with 6, and a recent announcement of the proposal to purchase 11 more; the Chicago & North Western with 4, and the Chicago, Burlington & Quincy with 3. Since the beginning of last year at least 26 Diesel-electric locomotives have been ordered for service in this country. Such data as are available in connection with the operating costs of Diesel-electric locomotives in switching service indicate an extremely high availability for service and that the principal items where savings in expenses can be made are those related to fuel and water costs and enginehouse expense. Figures which have been devloped as the result of operation indicate that the Diesel switcher can save almost 50 per cent of the service-hour cost of a steam locomotive.

The progress that has been made to date in the use of Diesel engines in railway service justifies the expectation that this type of equipment will find a definite place in the field of rail transportation. The performance of Diesel-electric locomotives in switching and transfer service has been such as to indicate that this class of service will undoubtedly offer the greatest immediate opportunity. In the field of passenger service the reduction in weight which has already been accomplished in the new high-speed trains has broadened the opportunities for the internal combustion engine in the rail-car field. How far its introduction in road locomotive units may be expected to go awaits experience with trial installations before the answers to the economic questions involved can be determined.



Tastefully Decorated Dining Cars, Air-Conditioned, Have Done Much To Add to Travel Comfort

Style Becomes a Factor of Importance in Passenger-Car Design

New architectural and decorative treatment, air conditioning and comfortable appointments make travel attractive— New materials effect weight reduction

UNTIL recently the term "passenger-car design" implied exclusively structural and mechanical design. The controlling considerations were engineering and economic. They had to do with strength of the structure under both static and dynamic loads, the first cost, cost of maintenance, and, so far as interior decorations and appointments were concerned, the standardization of upholstery and uniformity of decorative treatment.

In connection with passenger trains and coaches for which orders have recently been placed the term "design" is taking on a new meaning. Stress is being placed on the artistic design of the equipment—on the architectural treatment both of the exterior and the interior; on color harmony in interior decorations; on the appointments and facilities which make for passenger comfort and enjoyment. This new emphasis is highly significant. It marks a revolutionary change in the thinking of the railway industry toward this branch of its service. From an attitude of hopelessness at the declining volume of passenger travel and an emphasis on methods for reducing the expense of a necessary service from which profit was no longer to be expected, the change has been to an attitude of hope accompanied by studied efforts to attract passenger travel toward the railroad with emphasis on increasing revenues as well as on decreasing expense.

The designs of the conventional rail-motor cars of the



A Modern Cafe-Lounge Car

past decade were largely influenced by their ability to reduce the cost of an unprofitable service rather than with the thought of using them to develop new business. Today, the high-speed, light-weight rail-motor trains already built and on order are being looked upon as traffic-building, as well as expense-reducing agencies. New materials are being employed to reduce weight not only in these trains, but also in other new passenger-car units in order that higher speeds may be attained without demands for excessive horsepower capacity because the railways are becoming convinced that the public wants speed on the railways as well as in the air. The result of this sensitiveness to the wishes of the public wherever it has been given concrete expression has been a display of tremendous interest on the part of the public.

Taste—Comfort—Convenience

The great importance, from the standpoint of passenger comfort and enjoyment of other developments which have been introduced in existing equipment, has been obscured by the more spectacular value of the light-weight, articulated trains. The introduction of air conditioning and the complete change in passenger-car ventilation which it is bringing about have not only removed the discomfort of hot-weather travel by making the passenger-car interior more comfortable than a hotel room, but has also removed the dirt and grime from travel which formerly was equally inescapable, winter or summer.

The use of rubber as a noise insulator is making progress with results which add much to the comfort and pleasure of travel. Seats in which comfort takes precedence over reversibility have done much to improve the traveling qualities of a growing number of existing railway coaches.

The railways are discovering that the engineering talent which is competent to develop the structural and mechanical designs and specifications for a passenger coach are not thereby necessarily endowed with the trained taste required to produce pleasing effects with line, color and fabric. Artist-designers are finding increasing employment in guiding the selection of architectural and decorative elemen'ts, with results which are infinite improvements over the conventional standardized engineering product.

New Trends in Car Lighting

Three distinct trends are evident in present-day car-lighting practice. One of these is brought about by the decorator who, in some cases, has been inclined to regard lighting as a detail of interior decoration rather than as an aid to the passenger in riding. Another type of lighting that has been finding some popularity is the fully indirect type, such as is used in the Burlington and Union Pacific high-speed trains. This method probably produces the best quality of light, but has very low efficiency. There is another group which places efficiency above either decorative effective or the utmost in light quality, believing this to be necessary if the passenger is to be provided with enough light by which to read comfortably without placing undue demands on the limited power available in most cars. Various combinations of direct and indirect lighting are being studied and modern designers are displaying originality and taste in adapting decorative treatment to the needs of lighting efficiency.

The new light-weight, high-speed articulated trains, streamlined to permit high speeds without an excessive ratio of horsepower to weight, have met with a tremendous popular appeal and, in the light of that interest, it is difficult coldly to appraise their significance in the future of railway transportation. For the moment at least, they have restored romance to the rails and so are exerting a tremendous influence on present and future public relations.

New Materials and Weight Reduction

The two trains already built are the result of efforts to effect the maximum practicable reduction in weight with two new materials of construction—aluminum alloys and stainless steel. This urge to reduce weight is, in part at least, responsible for the articulated form of the trains and, together with the special consideration given to the smoothing up of exterior surfaces and the streamlining of the front and rear ends, was dictated by a desire to save horsepower and permit the installation of internal-combustion power plants in the trains.

In one respect the self-propelled articulated train is a complete departure from a fundamental practice of American railroading in that the train replaces the coach as a unit. Such train units provide facilities to meet a fixed set of conditions as to head-end and passenger requirements. That they will be applied, except in special cases where traffic requirements are relatively stable, is not at all likely. The great bulk of passenger traffic on American railroads will still be handled by trains of flexible make-up in which the individual coach is the unit.

The possibilities for weight saving offered by aluminum, stainless steel, and the new corrosion-resistant high-tensile alloy recently placed in production by the plants of the United States Steel Corporation, however, are not confined to trains or coaches of any specific form, and orders have already been placed for a number of coaches of materially reduced weight to be hauled by head-end motive power and to be interchangeable with conventional equipment.

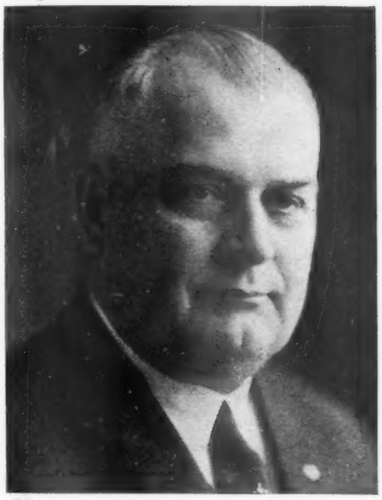
Reducing Air Resistance

Complete streamlining of trains can only be attained with some loss of flexibility, as a car of special form must be provided for the rear end. The relative value of head-end and rear-end streamlining, however, decreases as the length of the train increases and the relative effect of skin friction increases. It is probable, therefore, that, except in the case of relatively short trains, much can be gained by careful attention to the smoothing up of exteriors, even without resort to extreme changes in head- and rear-end formation. Incidentally, it should be pointed out that no small part of the decrease of head-end resistance of the light-weight, streamlined trains now in service is the result of a reduction in cross-sectional area amounting to about 20 per cent. Streamlining of ground vehicles necessarily involves a compromise, and the forms so far developed are purely empirical.

The Future Will Bring Greater Comfort

Developments now taking place clearly indicate that passenger service of the future will provide greater comfort. Lighter weight and better form will permit higher schedule speeds without excessive cost. That attractiveness and comfort may prevail, as much attention will be given to matters of taste in decoration and to the comfort and convenience of appointments in passenger-car design as is given structural engineering and operating economics.

A. R. A., Mechanical Division, Reports Notable Progress in Research



E. B. Hall, Chairman

Year's activities strikingly portrayed in committee reports presented at Chicago meeting of the General committee



O. A. Garber, Vice-Chairman

THE work of the American Railway Association, Mechanical division, during the past year, as reflected in progress reports of various standing committees, presented at the General Committee meeting at Chicago on June 27 and 28, gives unmistakable evidence of the extensive engineering research now being conducted in the interests of better railroading. Not only is a large volume of more or less routine but important legislative work covered in the 17 committee reports, but at least six of these reports contain data and information regarding research, experiments and service tests of new materials and methods calculated to prove of the utmost value in improving railroad service of the future as regards both performance and cost.

Typical examples of this constructive work in the interests of the general public and the railroads of the future are afforded by the report of the Mechanical Division, Committee on Research. Under the supervision of Director H. A. Johnson, this committee has given attention to a total of 19 special assignments, making extensive surveys, studies, or tests in connection with such subjects as: Standard method of rating and inspecting locomotive coal; sweating of steel car roofs; streamlining of high-speed passenger trains; air-conditioning of passenger cars; possible savings in operating cost by the use of lighter freight cars; economics of freight-car dimensions and capacities; railway refrigeration service; automatic train-line connectors, etc. The Committee on Car Construction has made exhaustive technical stress and impact tests of the A.R.A. standard box car with highly satisfactory results. It has also tested and proposes to make further tests of improved trucks and spring snubbing devices designed to promote easy riding in freight cars at modern high operating speeds and thus reduce lading and equipment damage. Other committees have perfected locomotive details; continued research in draft gears; specified maintenance requirements for the new AB freight-car brake; developed improved car-wheel specifications; studied the important problem of lubricating railway equipment; tested and specified more efficient loading methods; analyzed the requirements for more safe and satisfactory tank-car service; and conducted tests in many other pertinent subjects.



V. R. Hawthorne, Secretary

The two-day meeting of the General Committee was presided over by Chairman E. B. Hall, general superintendent of motive power and machinery, Chicago & North Western, and Vice-Chairman O. A. Garber, chief mechanical officer, Missouri Pacific, the general order of business being followed in accordance with a docket prepared by Secretary V. R. Hawthorne. As there is no provision for an election of officers of the Mechanical Division, except at a regular annual convention, the terms of Mr. Hall as chairman and Mr. Garber as vice-chairman were extended until June, 1935. Six members of the General Committee whose terms expired in June, 1934, were also reelected to serve until June, 1936, these members being as follows: J. W. Burnett, general superintendent of motive power and machinery, Union Pacific system; F. W. Hankins, chief of motive power, Pennsylvania; R. G. Henley, superintendent of motive power, Norfolk & Western; F. R. Mays, general superintendent of motive power, Illinois Central; John Purcell, assistant to the vice-president, Atchison, Topeka & Santa Fe; and Silas Zwight, general mechanical superin-

tendent, Northern Pacific. The vacancies in membership of the General Committee due to resignations of C. E. Chambers and A. R. Ayers were not filled.

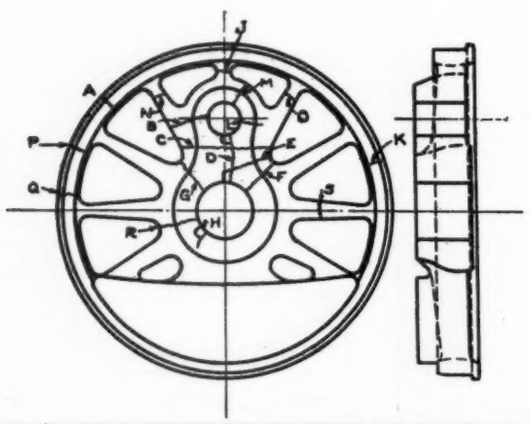
Full Membership Meeting in 1935

One of the most significant actions taken by the General Committee was its unanimous vote to hold a full membership meeting in June 1935 the decision regarding the question of exhibits to be made later, contingent upon business conditions. This action was taken to permit the representatives of all member roads who have not had an opportunity to be present at a regular annual meeting of the A.R.A. Mechanical Division since 1931 to participate in the proceedings and help formulate the action taken as well as to pass on it subsequently by letter ballot. The thought was also advanced that with a lapse of four years since the last regular annual meeting a sufficiently large number of new appliances, tools, equipment specialties, etc., will have been developed to justify the special study and consideration of mechanical department officers.

Locomotive Construction Report

The report of the Committee on Locomotive Construction was divided into a consideration of 12 subjects, assigned to various subcommittees. Replies to a questionnaire on the advantages and disadvantages of high boiler pressures indicated that pressures as high as 300 lb. per sq. in. are being carried successfully in conventional radial stay firebox boilers. Boiler pressures of about 220 lb. were most commonly reported, although a considerable number of locomotives are in service carrying a pressure of 240 lb. and one road reported that any new locomotives it ordered would probably carry a pressure of 250 lb., or possibly 275 lb.

The committee obtained little additional data covering the development and use of oil-electric locomotives for the year 1933, due to the relatively small number of locomotives of this type installed during the year. The tabular list of these installations showed a total of 18 locomotives installed on six roads, the smallest being a 65-ton, 460-hp. locomotive for the Chicago, Burlington & Quincy, and the largest a 115-ton, 800-hp. locomotive for the Northampton & Bath.



LOCATION or FRACTURES

A	B	C	D	E	F	G	H	J	K	L	M	N	O	P	Q	R	S
1008 R.M.	850 L. Int.	835 R.M.	842 R.M.	1132 L.M.	1106 L.M.	1132 R.M.	1032 R.M.	874 L.F.	869 R.Int.	605 R.M.	874 L.F.	874 L.F.	874 L.F.	869 R.Int.	1010 R.F.	1008 R.F.	1006 R.F.
	874 L.Fr.	841 R.M.	850 R.M.	1106 R.M.				1008 L.B.	1008 L.M.		869 R.Int.	869 R.Int.	1018 L.F.	880 R.Int.	1022 R.F.		1008 R.M.
	598 L.Int.	845 R.M.	864 R.Int.					1008 L.M.			880 R.Int.	880 R.Int.		1008 R.M.			
	1029 R.M.	847 R.M.	874 L.Fr.					1006 R.B.			1008 R.Int.	1008 R.Int.		1010 L.F.			
		831 R.M.	1030 R&LM.					1009 R.M.			1018 R.F.	1015 R.F.		1022 R.F.			
		833	1034 R.M.														
		1131 R.M.															
		1132 L.M.															
		1134 L.M.															

Typical Tabulation of Failures of Locomotive Driving Wheels

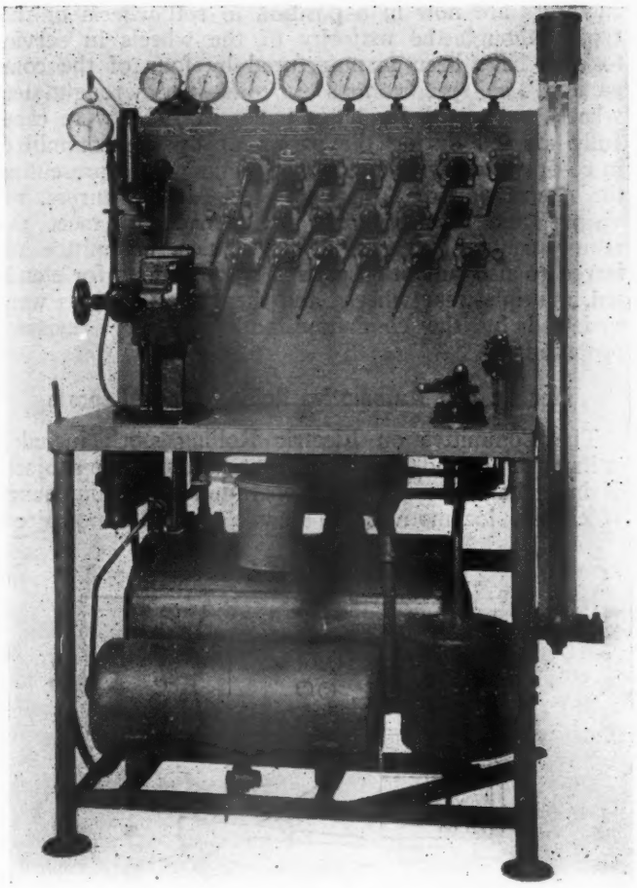


Defective Hose (Below) Which Should Be Removed—Hose (Above) With Hole in Outer Cover and Fabric in Good Condition. This Hose Should Not Be Removed Until There Is Some Indication of Damage to the Fabric

Additional subjects considered by the committee included the counterbalancing of locomotives, standardization of safety valves, light-weight pistons, composite locomotive axles and crank pins, driving and trailer tires, and methods of reporting, analyzing and correcting locomotive defects. In connection with thin-wall-section type wheel centers, a table in the committee report showed the installation for test purposes of 158 double-disc-type wheel centers in service on 18 roads and 120 Boxpok-type wheel centers on 12 roads. Replies to a questionnaire on roller bearings were received from 43 roads, 7 of which reported roller-bearing installations on both locomotives and tenders, 9 on locomotives only and 10 on tenders only. These installations were divided on the basis of locomotive or tender sets as follows: Engine trucks, 286; main driving axles, 2; all driving axles, 6; trailer trucks, 24; tenders, 254; tender boosters, 25; electric locomotives, 75; and three-cylinder locomotive valve gears, 73. Only one road reported roller-bearing applications on the back end of main rods and one on main connection side rods. The committee reported that it is working on codes of rules to govern the storage and firing up of locomotives; also the handling of locomotives which fail on the road.

Report on Car Construction

The Committee on Car Construction reported on the comprehensive extensometer, deflectometer and impact tests of the A. R. A. standard box car in comparison



Complete Assembly of the New AB Freight-Car Brake Test Rack

with the tentative A. R. A. design first submitted in 1923 and the Railroad Administration design produced in 1919.

The more significant results of these tests (described in an article beginning on page 925 of the *Railway Age* of June 23) were summarized in the statement that the new standard car is stressed lower and more uniformly in its essential members than either of the other two designs, even though for equivalent size and capacity, it is about 3,500 lb. lighter, and some of its sections, including the centersill member, are smaller. In the impact tests, the A. R. A. standard car demonstrated its capacity to absorb abnormal collision punishment under full axle load without damage of consequence, whereas both of the other types of cars tested showed unmistakable evidence of approaching failure under somewhat less punishment.

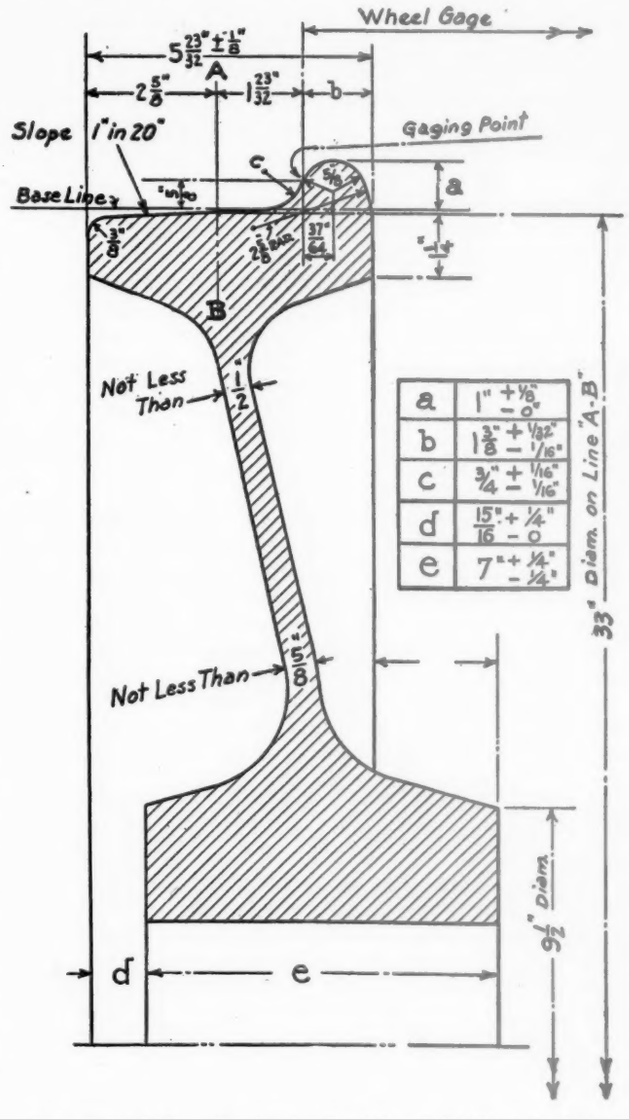
In regard to cost, the committee stated that an examination of bids, made in May, this year, indicated that the new A. R. A. standard box car may be purchased for about $100 less than the Railroad Administration design and $50 less than the tentative A. R. A. car. Work on the construction of rolls for the new Z-bar centersill and side post sections, the base W-section side plate and the alternate Z-bar side plate is now rapidly nearing completion.

The committee reported that, in co-operation with the American Railway Car Institute, it has practically completed the designs of the proposed standard 50- and 70-ton hopper cars. Preliminary information is also being developed regarding the basic features, arrangement and characteristics of a car which will best meet the requirements of traffic handled in refrigerator cars. A subcommittee report on non-harmonic spring devices will be presented in greater detail later on in this report.

Regarding extensive tests and observations of condensation in box cars, the committee reported progress and said that this is an involved subject which no doubt will require further extensive detailed study and research in order that proper conclusions may ultimately be reached, including the important question of economy. Co-operation is suggested with the Freight Claims division and with the director of research for the purpose of formulating a further program of investigation and test to be carried out during the coming year. Additional subjects covered in the committee report included the treatment of lumber for car construction, method of splicing freight-car centersills, journal-bearing wedge construction, and a recommended standard platform height for passenger cars.

Couplers and Draft Gears—Brakes

The report of the Committee on Couplers and Draft Gears was divided into a consideration of several major subjects, including the development of recommended changes in interchange rules, designed to permit obtaining greater serviceability of coupler parts; recommendation of minor changes and slight improvements in the Type-E coupler; a study of the possibility of adopting a standard



Recommended Cross Section for One-Wear Solid Wrought Carbon Steel Wheels

type of cast-steel coupler yoke to be substituted for the present standard wrought yoke; and a report on approved tests of draft gears. The committee reported that it is working with the Committee on Prices and the Arbitration Committee with a view to subdividing the list of non-approved draft gears in Interchange Rule 101, Section 2, into non-obsolete and obsolete gears, and thus remove all incentive for maintaining obsolete gears in service.

The report indicated that, at the suggestion of the federal co-ordinator of transportation and the special request of M. J. Gormley, president of the American Railway Association, consideration is being given to making a series of tests to determine the necessity for increased draft-gear travel or the use of selective travel devices, this matter having also been discussed with the Interstate Commerce Commission, Bureau of Safety. A joint committee, headed by Samuel Lynn, superintendent of rolling stock, Pittsburgh & Lake Erie, was appointed to formulate appropriate rules governing the systematic inspection and maintenance of draft gears,

The Committee on Brakes and Brake Equipment recommended the adoption as standard practice of a new type of retaining valve cap, designed by the air-brake companies, with small slotted openings to exclude insects and prevent clogged valves with attendant stuck brakes and train delays. It was also suggested that certain specific instructions for the use of condemning gages for the Type-K triple valve be adopted as standard practice and included in the Manual. The more rapid and general installation of the new freight triple graduating spring to eliminate undesired emergency applications was strongly urged. The committee defined the proper terms covering defective air hose with a view to avoiding unnecessary removal and scrapping, and closed its report with a detailed and comprehensive recommendation regarding the preferred methods of cleaning, lubricating, and testing the new AB freight-brake equipment. An important supplementary report covered standard brake-beam gages, fixing the minimum and maximum dimensions for the component parts and assembly of the A. R. A. standard No. 15 brake beam.

Report of Committee on Wheels

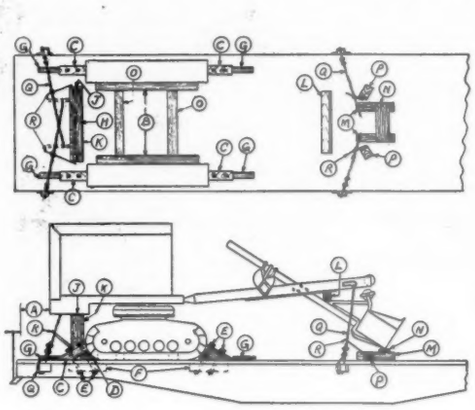
The Committee on Wheels, in the first part of its report, paid a striking tribute to Chairman A. Knapp, inspecting engineer, New York Central, who passed away on May 3, 1934, as a result of a fatal accident while on his way to attend a committee meeting in New York. Under the direction of Acting-Chairman H. W. Coddington, engineer of tests, Norfolk & Western, the committee continued its work and reported on cast iron wheel design, defects and condemning limits. The committee stated that, as a result of an exhaustive study of mounting practices for cast iron wheels, made during the year by the Association of Manufacturers of Chilled Car Wheels, it was felt that the minimum tolerance in general should be .006 in. and the maximum tolerance .009 in., the latter being suggested to avoid excessive expansion of the hub which produces undue stress in the sections. The committee proposed to include the results of this research in the revision of the Wheel and Axle Manual. It also recommended submitting to letter ballot certain changes in limit gages for remounting wheels and also in the steel wheel service-metal gage.

The development of the one-wear wrought-steel wheel has progressed to a point where all of the manufacturers are now in a position to roll wheels of this type, although the majority of the wheels in service to date have been manufactured by four of the companies. The specifications for one-wear wrought-steel wheels, submitted for letter ballot in 1933, were carefully studied during the past year by the committee, in co-operation with a technical committee, representing the Association of American Steel Manufacturers, revisions and modifications being made to meet the requirements of service. The technical committee referred to also submitted revised specifications for standard, multiple-wear wheels, and these specifications were reviewed by the committee and necessary revisions proposed.

Electric and Automotive Rolling Stock Reports

The Committee on Electric Rolling stock included in its report considerable important data on three subjects of immediate interest in the operation and maintenance of electric locomotives, no new electrification projects having been started in the current year. These subjects were: Methods of handling electric locomotives in roundhouses and terminals; automatic control of steam heating boilers on electric locomotives; and design and operation of front windows arranged for clear vision. An additional exhibit showed a tabulation of data on electric locomotives placed in service on the Pennsylvania for the years 1930 to 1933, inclusive, all of this information having not been previously reported.

The Committee on Automotive Rolling Stock expressed the opinion that this type of equipment will



Minimum Requirements for Securing Machines on Which Body Portion Rotates

Item	No. of Pcs.	Description
A		Brake wheel clearance.
B	2	4-in. by 6-in., length of crawler, nailed or bolted to floor.
C	4	6-in. by 6-in., hardwood, length to suit.
D	4	6-in. by 8-in., hardwood, to fit between crawler and Item C.
E	8	¾-in. dia., with nuts and washers, through Items C, D, F and floor.
F	4	2-in. by 4-in. by 18-in., or metal plates ⅜-in. by 4-in. by 6-in.
G	4	2-in. by 4-in. by 18-in., nailed to floor with 30-D nails.
H	1	4-in. by 6-in., long enough to extend beyond Items J, nailed or bolted to floor.
J	2	6-in. by 6-in., hardwood, fit between Item H and body of machine.
K	2	1-in. by 8-in., length to suit, nailed to Items J.
L	1	6-in. by 6-in., hardwood, length to suit, wired in position after weight of boom has been placed on same.
M	2	6-in. by 6-in., length to suit, nailed to floor.
N	1	1-in. by 8-in., long enough to extend over Items M.
O	2	4-in. by 4-in., long enough to fit between Items B, each secured to floor with bolts or 60-D nails.
P	2	6-in. by 6-in. by 9-in., beveled blocks, nailed to floor.
Q	4	Rods 1¼ in. dia., or double steel cable ⅝ in. by 6 by 7 with ends overlapped at least 12 in. and secured with two 2-bolt cable clamps.
R	4	⅝ in. dia. bolt, or ¾ in. dia. pipe.

eventually be divided into three classes for: (1) All railway service: (2) all highway service: (3) dual highway and rail service. It stated that during the past few years some very important improvements have been effected in Diesel engines, such as successful development of the two-cycle principle and other details which now make possible the building of engines that will meet the economic requirements of Diesel engines in the railway motive-power field and in the heavy-duty highway motive-power field. The report commented on the adaptability of the internal-combustion engine to light-weight, high-speed, streamlined trains, and was concluded with an exhibit outlining in a general way the equipment and facilities necessary for a typical, co-ordinated rail-highway service in a specially-selected territory.

Tank Cars—Automatic Train-Line Connectors

The Committee on Tank Cars reported that during the year it has considered a total of 203 dockets and applications for approval of designs, of which 102 covered shipping containers, 6 applications covered 15 special cars for the transportation of 15 one-ton chlorine containers, each, 84 covered alterations in existing equipment, 10 applications covered tank-car appurtenances and one was a proposed modification of the specifications covering angle valves for use on Class 106-A series tanks. Fusion-welded tanks were also considered in the report, which recommended the extension for another year of the effective dates for tank-car requirements in Interchange Rule 3. Other details referred to in the report included the patching of tank-car tanks, reduction in thickness of interior compartment heads, safety valves for Class 105-A series tanks, and the failures of tank-car tanks.

For the Joint Committee on Train-Line Connectors, H. A. Johnson reported that the investigation in the laboratories at Purdue university was continued. In addition to the six freight-type connectors and the three passenger-type connectors tested previous to June, 1933, the Johnson passenger-type connector, the Roberts passenger-type connector and the Cobb freight- and passenger-type connectors have been received and are undergoing tests.

Arbitration—Specifications—Loading Rules

The Arbitration Committee decided 16 cases, No. 1721 to 1736, inclusive, during the year and included with its report a copy of the decisions. It recommended against any further extension beyond January 1, 1935, of the effective date of the requirement in Rule 3 specifying non-acceptance in interchange of Class E-4 and Class F freight cars. The committee recommended the addition of a requirement in Rule 3 providing for the application of the standard No. 15 or A. R. A. No. 3 brake beam on all cars built new on or after January 1, 1935. Among other detailed changes suggested in the requirements of interchange, the committee recommended revisions in Rules 9, 70 and 98 to penalize the substitution of double-plate in place of single-plate, cast-iron wheels. The committee directed the attention of all car owners to the necessity for stenciling trucks, as recommended in Section L of the Manual, for purposes of identification with their respective car bodies, in case of accidents.

The Committee on Specifications for Materials submitted six exhibits, containing recommended specifications for galvanized sheets, rivet steel and rivets for steam boilers and other pressure vessels, steel tires, all-year car oil, reclaimed oil, and carbon-steel axles for cars and locomotive tenders. It also recommended that the following specifications be removed from the Manual, as representing special material on which there is no agreement among the railroads and which it appears desirable, therefore, to purchase under individual specifications; alloy steel, quenched and tempered forgings, fire hose, cast-iron cylinders and cylinder parts, foundry pig iron and welding wire.

The Committee on Loading Rules submitted the usual extensive report and recommendations governing the rules for loading commodities on open-top cars. Experimental loads were operated over the railroads and studies made of the best loading methods. It was suggested that a circular letter be sent out to the members, urging more general and strict compliance with Loading Rule 19 pertaining to the inspection and placarding of cars loaded with machines of swinging or pivoted construction.

Revised Specifications for New Car Oil, Including an All-Year Oil

	Summer Car Oil	Winter Car Oil	All-Year Car Oil
Flash—minimum	300 deg.	300 deg.	300 deg.
Saybolt viscosity:			
At 210 deg.—min. desired			50 sec.
At 210 deg.—min. permitted	55 sec.	40 sec.	47 sec.
At 100 deg.—max. desired	450 sec.	260 sec.	
At 100 deg.—max. permitted	725 sec.	300 sec.	300 sec.
Maximum pour point test—max.	20 deg.	0 deg.	0 deg.
Water—max.	0.10 per cent	0.10 per cent	0.10 per cent
Tarry matter—max.	0.10 per cent	0.10 per cent	0.10 per cent
Insoluble impurities (dirt)—max.	0.10 per cent	0.10 per cent	0.10 per cent

Any material used for blending, when subjected to a distillation according to A. S. T. M. gas-oil method, must show not more than 5 per cent distilling below 500 deg. F.

Other Committee Reports

The Committee on Prices for Labor and Materials continued its work of analyzing material, labor and new equipment costs in A.R.A. interchange rules and recommended necessary changes to be made in the supplement effective August 1, 1934.

The Committee on Lubrication of Cars and Locomotives reported progress in the study of lubrication practices and problems and recommended specifications for an all-year-service car oil which has been adopted as recommended practice, as included in the report of the Committee on Specifications for Materials. The report also recommended the development of specifications for cut-back oil and reclaimed oil. The committee stated that many journal bearings with hair-line cracks are being scrapped unnecessarily. It also recommended that, when changing wheels, journal bearings shall be carefully examined and re-used if they have the proper crown fit and are not defective. This is contrary to the present general practice on many roads of applying new bearings to foreign cars when wheels are changed on account of owner's responsibilities and applying second-hand bearings when the handling line is responsible for the wheel change.

The Committee on Locomotive and Car Lighting held no formal meetings during the year but discussed a number of matters of importance by correspondence and recommended the elimination of specifications for axle light belting as they are seldom used. A table was included in the report showing the axle-pulley dimensions and range of pulley locations generally accepted as good practice on all railways using this type of drive.

The Joint Committee on Utilization of Locomotives and Conservation of Fuel made no field surveys during

1933 but presented its usual progress report, indicating trends in freight, passenger and yard service during the year.

Progress Report on Tests of Trucks and Truck Springs*

During the fall of 1933 the Car Construction Committee conducted a series of tests to determine the riding characteristics of existing truck springs and to ascertain to what extent the riding characteristics can be improved by existing devices, variously desginated as friction springs, snubbers and stabilizers, or by special trucks; also, what mechanical characteristics these devices should have for most desirable service performance, with the view of eventually establishing specification requirements. The primary purpose of the investigation is to reduce the damage to lading and to the car equipment caused by vertical oscillation of the truck springs and car body, and it is the opinion of the committee that the riding qualities tests which were made give a true and accurate measure of the ability of the various devices tested to reduce lading damage from vertical oscillation on cars equipped with true wheels and operated at speeds up to 60 m.p.h.

Riding-qualities tests were supplemented by laboratory tests, following which the various devices were placed in service under refrigerator cars to obtain information as to their endurance qualities. The purpose of the laboratory work was, first, to secure measurements and performance records of the devices when they were new, which could be used to detect changes in characteristics as they developed in service and, second, to develop, if possible, some satisfactory laboratory test that would be an index of riding qualities. [No information of value with respect to the second objective was developed by the laboratory tests.—EDITOR.]

Devices and Trucks Submitted to Tests.—The tests were limited to one device or one type of truck, or both, from each manufacturer. Two car sets of each device or truck were furnished for use in riding-quality, laboratory and service tests. The devices and trucks submitted to tests are as follows:

SPRING GROUPS FOR 40-TON CAPACITY CARS

1933 standard A.R.A. coil springs, Class C
Old standard A.R.A. coil springs, Class C
Barber friction bolster spring, Type 3
Cardwell friction bolster spring, Type A
Coil-elliptic springs for conventional trucks
Edgewater, Class J-63-K, ring-spring truck spring
Frost friction truck spring
Holland volute spring
Miner truck spring snubber, Class C-2
National car stabilizer, Type F-2-A

SPECIAL TRUCKS FOR 40-TON CAPACITY CARS

Barber stabilized truck
Coil-elliptic springs for double-truss trucks
Goodwin car stabilizer truck
National, Type B, "Coileaf" truck

SPECIAL TRUCKS FOR 50-TON CAPACITY CARS

Pennsylvania—Kiesel truck
Pennsylvania—Young truck

Test Procedure.—A special train consisting of two electric motor cars and two test cars was used in order to make operating conditions as nearly identical as possible for all tests. To provide further assurance that all devices would be compared on an equal basis, two 50-ton box cars, fully equipped for making spring and truck tests, were rented by the A. R. A. from the Symington Company. Each test consisted of making three round trips on a definite schedule of speeds from 30 to 60 m.p.h. between Rochester and Avon, N. Y., on the Erie railroad. Both test cars were equipped with instruments to measure the performance of the truck springs and the riding characteristics.

The test track between Rochester and Avon, a distance of 18.5 miles, was fairly representative of main branch-line track and was laid with 80-lb. and 100-lb. rail of 30 and 33-ft. lengths respectively, with staggered joints. The test track was all single track, with electric operation and with some steam-train service.

Test Cars.—The test cars were from a lot built for the D. L. & W. in 1928. They are representative construction, with steel under-frames, steel ends and steel superstructure frame, and outside wood sheathing, substantially to A.R.A. recommended-practice design for double-sheathed box cars. The light weight (empty) of each car after test equipment was installed was approximately 50,000 lb. The cars were originally equipped with 50-ton trucks, 5½-in. by 10-in. journals, but since most complaints of damage to lading had pertained to 40-ton capacity cars, it was decided to confine the investigation principally to 40-ton equipment and 40-ton trucks were applied to the test cars. New single-plate cast-iron wheels, mounted on axles with 5-in. by 9-in. journals, were used on the test cars. The tread of each wheel was ground true with the journal-bearing surface, using A.R.A. standard taper, and each wheel of a pair was finished to the same tape size.

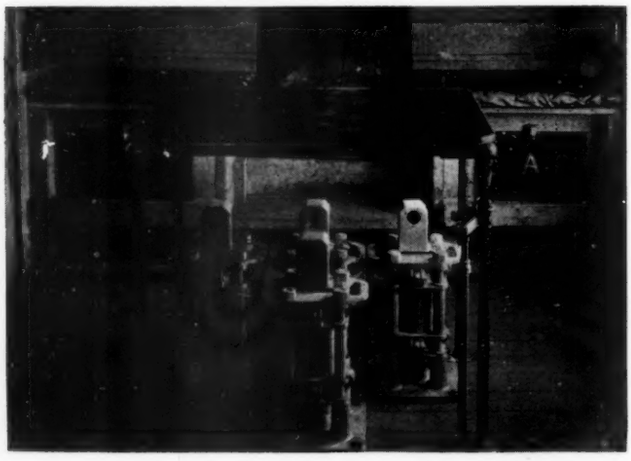
Throughout the series of tests one car, designated as car *A*, was used for testing the new devices or trucks, while the other, car *B*, was kept as a yardstick, using only the 1933 standard A.R.A. coil springs, Class C, for 40-ton trucks and Class D for 50-ton trucks.

Load.—All devices and trucks submitted were tested under two load conditions; namely, light-load and heavy-load conditions. Under the light-load conditions (40-ton capacity cars), the weight of each car was approximately 85,000 lb. on rail and, under the heavy-load conditions, 135,000 lb. In the riding-qualities tests with the 50-ton capacity trucks, the light-load weight was 105,000 lb. on rail and the heavy-load weight, 168,000 lb. Sand bags and pig iron were used for loading the cars to the desired weight.

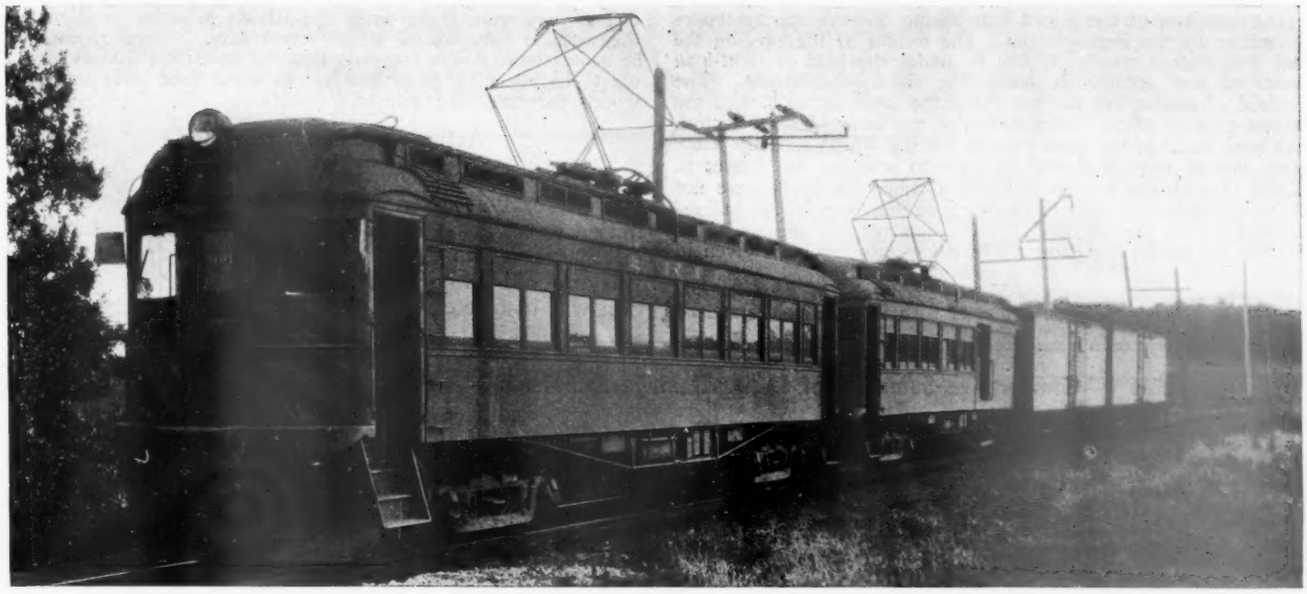
Test Instruments.—Four Symington lading dynamometers were installed in the center of each car to measure the effect on lading of vertical oscillations or bouncing of the car. Each instrument had a 100-lb. weight supported on a spring, which held the weight against a stop at the top of the frame. The amount of pressure of the weight against the top stop was adjusted by compression of the spring underneath. This was set for some value in excess of the weight and, having four instruments in each car, it was possible to set them at four different values in excess of the 100-lb. weight. With this instrument fastened to the floor of the car the weight is subjected to the dynamic loads imposed by these loads. If the shock is greater than the value for which the spring on an instrument is adjusted, it will cause the weight to leave the top stop, and when it has moved .005 in. from this stop an electric circuit is broken and the event registered on a counter. If a shock causes a registration on all instruments set for values up to 100 per cent in excess of the weight, it means that it would have made the pressure between a piece of lading and the supporting part of the car momentarily increase 100 per cent. This increase in pressure or load is what tears meat from hooks and damages other kinds of lading. Under certain circumstances lading may be lifted from the car floor as a result of these shocks and the impacts following cause severe damage. With the lading dynamometers functioning in this manner it was possible to determine the number of shocks of four different intensities on each car. The electric counters were read at each mile post during every run, which enabled the data to be separated according to different running speeds.

The car *A* lading dynamometers were set for 25, 35, 50 and 75 per cent above gravity during the light-load tests. When making the heavy-load tests and also light-load tests of plain coil springs, the settings on the car *A* instruments were changed to 25, 50, 75 and 125 per cent above gravity. This latter range was used on car *B* (which was always equipped with 1933 A.R.A. coil springs) for all tests except a few at the beginning of the program when the settings were as first given for car *A*. The range of settings used was determined by experience. A value of 25 per cent above gravity was chosen as the minimum because shocks of that intensity do not feel to be particularly damaging, and the maximum value used was such that few or no counts were secured on that instrument. The difference in setting of the

* Abstract of a report submitted by a sub-committee of the Committee on Car Construction.



Group of Four Lading Dynamometers in Center of Test Car



Test Cars A and B Attached to the Two Electric Motor Cars

instruments in the two cars does not prevent comparison of the shocks occurring in each car, which comparison is made by means of a "lading-damage factor" as explained later.

Each car was also equipped with four Symington bolster movement totalizers, one for each nest of truck springs, to measure the total bolster downward motion during any test run or portion of a run. The other instruments used during the tests included spring deflection gages, speedometer and speed recorder.

Lading-Damage Factor.—The lading-damage factor is an abstract number computed from the data obtained from the lading dynamometers for the purpose of comparing the overall performance of each device or truck submitted with the performance of the 1933 A.R.A. standard coil springs. The lading-damage factor submerges the identity of the individual shocks and gives an index of the riding qualities of the car for entire test runs.

The lading-damage factor was computed by multiplying the number of shocks of each intensity by an appropriate factor and adding the products. The multiplying factors used are the squares of the ratio of the settings for the different instruments, as follows:

Setting of the instrument, per cent	25	35	50	75	125
Setting ratio	1.0	1.4	2.0	3.0	5.0
Multiplying factor	1	2	4	9	25

These factors are empirical and have been chosen from the fact that the shocks are probably in relation to the deflection of the truck springs which produce them. The energy involved in spring deflection is proportional to the square of the deflection, and it is this uncontrolled energy that produces the shocks. From this it is seen that one 125 per cent shock is considered to be 25 times as damaging as one 25 per cent shock. It is felt that this is not an unreasonable assumption.

Results of Riding-Qualities Tests—40-Ton Capacity Trucks and True Wheels.—The tests show that at certain speeds with plain coil springs heavy spring oscillation occurs which, no doubt, would cause heavy damage to lading. The intensity of this spring oscillation and the speed at which it is most severe depends upon the load in the car and the stiffness of the springs.

With the old standard A.R.A. coil springs installed in the trucks, test car *A* rode smoothly up to speeds of approximately 40 m.p.h. with the light load and approximately 36 m.p.h. with the heavy load. As speed was increased above these values vertical oscillation of the car started, it being most violent at a speed of approximately 47 m.p.h. at light load and 41 m.p.h. at heavy load. These speeds at which the action is most violent are called critical speeds, and as speed was further increased above these values the oscillation decreased in violence. At light load the center of the car, where the instruments were located, rode fairly well at speeds above 55 m.p.h., but the ends were not as free from oscillation as the center. At heavy load the oscillation decreased in intensity until a speed of 48 m.p.h. was reached and then it began to increase again. It kept on increasing up to the maximum test speed of 60 m.p.h. and was so violent in the speed range from 50 to 60 m.p.h. that the springs were driven solid.

If the ends of the car oscillate 180 deg. out of phase, the center can be riding smoothly while the ends show considerable roughness. This was observed during heavy load tests of plain coil springs. However, when this condition was discovered there were not sufficient instruments available to place them in the car ends as well as in the center. With devices that do not permit oscillation, this condition does not occur.

Information on the action of car *A* under light load when equipped with 1933 standard A.R.A. coil springs was incomplete because this test was run in the early part of the series and high enough speeds were not attained, but a large amount of data was secured showing the action of these springs on car *B* which was always equipped with them while car *A* was equipped with the various test devices. The new standard springs have higher critical speeds than the old standard springs and for that reason oscillation does not start as soon as with the old coils, while the speed is being increased. When oscillation does occur, the effect is more damaging than with the old coils. Change in action of car *A* with different test devices had some influence on the action of car *B*, which was mainly a change in the maximum intensity of shock that occurred as a result of vertical oscillation. It had no influence on the location of the critical speed, as this is determined solely by the natural vibration period of the springs as determined by their deflection under the load they carry.

With the 1933 standard A.R.A. coil springs installed the cars rode smoothly up to speeds of approximately 43 m.p.h. with the light load and approximately 38 m.p.h. with the heavy load. Vertical oscillation took place as the speed was increased above these values, the critical speed with the light load being approximately 52 m.p.h. and, with the heavy load, approximately 47 m.p.h. As speed was increased above the critical value, the intensity of oscillation decreased but not so much as with the old standard coils. With the light load it remained fairly high up to 60 m.p.h. and with the heavy load it decreased in the middle of the car but remained high in the ends.

With both the old standard and the 1933 standard coil springs, increasing the load in the car lowered the speed at which the oscillations start and decreased the intensity of the shocks.

The effectiveness of the different test devices in improving riding qualities is shown in Table No. 1. This is given for information and is not intended to be used as a rating. For each device at each test load there is given a lading-damage factor for car *A* and also for car *B* and the percentage which the car *A* figure is of the car *B* figure. The common base on which these lading-damage factors have been computed is one round trip—Rochester to Avon and return—the figure being the average for all trips made with each device, which was three in most cases. Variation in results for car *B* is caused in part by the influence on this car of the different action of car *A* with the different devices. Test conditions were rigidly controlled so as to make results directly comparable. A low value of lading-damage factor indicates smooth-riding qualities and a high value rough-riding qualities. No attempt has been made to set a limit which marks the boundary between smooth and rough-riding qualities.

Results of Riding-Qualities Tests—50-Ton Capacity Trucks and True Wheels.—A series of tests was also made with 50-ton

capacity trucks installed under the test cars to determine the riding qualities of the Kiesel and Young 50-ton capacity trucks submitted by the Pennsylvania. The weight of the cars on the rail was approximately 105,000 lb. under the half or light-load condition and 168,000 lb. under the full-load condition. The method of conducting the tests was the same as used with the 40-ton capacity tests. Computation of the lading-damage factors has been made in the same way as for the 40-ton capacity truck tests, but no attempt should be made to compare the figures in Table II with the figures in Table I, since the loads were not the same in both cases. A comparative summary of the lading-damage factors for the 1933 A.R.A. standard coil springs, Class D, and the Kiesel and Young 50-ton capacity trucks is given in Table II.

Results of Riding-Qualities Tests—Eccentric vs. True Wheels —40-Ton Trucks.—A series of tests with 1933 and old standard coil springs was made with four pairs of eccentric wheels, mounted on axles with 5-in. by 9-in. journals, installed under car *A*. True or concentric wheels were used in all runs under car *B*. The eccentric wheels were inspected and measured at the shop, and it was decided that they were not condemnable and the low spots were not worn through the chill. However, it would be an improbable service condition to have all the wheels under a single car so much out-of-round.

In the tests with the eccentric wheels it was found that severe spring oscillation occurred at speeds between 25 and 30 m.p.h., whereas, with round or true wheels, there was no disturbance at these speeds. At high speed the eccentric wheels produced less disturbance than the true wheels. No testing of stabilizing devices with eccentric wheels was done. These tests were of a preliminary nature and no conclusions should be drawn therefrom.

Conclusions.—The tests made in this investigation show that freight cars equipped with 1933 standard A.R.A. or old standard A.R.A. coil springs developed vertical oscillation at critical speeds which is more pronounced at half load than at full load. This vertical oscillation or bouncing can be reduced or practically eliminated by the use of various stabilizing devices in conventional trucks or by special trucks. The effectiveness of the various devices tested was found to vary between somewhat wide limits. The use of these devices should effect savings by the reduction of vertical oscillation in cars which operate at speeds above 36 m.p.h. when cars are equipped with true wheels and at lower speeds when cars are equipped with wheels which are not true.

Service tests on all of these stabilizing devices and special trucks are now being made. Until these tests are completed, it is impossible to reach conclusions as to the comparative durability of these various devices.

All of the comparative tests of stabilizing devices and A.R.A. coil springs were made with true wheels in order to eliminate the variable influence of wheel eccentricity. There appears to be no reason to doubt, however, that the stabilizing devices tested would have similar protective values when used with eccentric wheels that they had with true wheels.

Action on Committee Reports

The Mechanical Division committee reports for this year were all accepted and necessary items ordered submitted to letter ballot. In the report of the Committee on Specifications Exhibit E pertaining to reclaimed oil was ordered withdrawn. The Committee on Lubrication was instructed to propose a plan for testing several methods of lubrication which have been developed recently and designed to afford improvement over the present conventional waste lubricating practice, including with its report to the General Committee an estimate of the cost of these tests.

The subcommittee of the Committee on Car Construction which has been studying condensation in steel roof box cars was instructed to continue its experiments with a view to determining how damage from this cause can be reduced. The paragraph in the Arbitration Committee's report pertaining to the substitution of double plate cast iron wheels in place of single plate wheels was questioned in an extensive discussion but the recommendation of the committee to submit this feature to letter ballot was sustained.

THE LOUISVILLE & NASHVILLE and the Colossal Cavern Company have decided to deed all of their properties in the Mammoth Cave National Park region to the United States Department of the Interior, National Park Service. The railroad holds under the Colossal Cavern Company, 1,084 acres of land in fee simple and 2,305 acres of cave rights in the Mammoth Cave National Park. These lands are being donated to the United States for the formation of a national park without any compensation whatsoever and form one of the largest single units in the national park area.

Table I—Comparative Summary of Lading-Damage Factors—40-Ton Trucks and True Wheels

	85,000 lb. on rail			135,000 lb. on rail		
	Car *A* test device	Car *B* 1933 std. coil springs	Car *A* per cent of Car *B*	Car *A* test device	Car *B* 1933 std. coil springs	Car *A* per cent of Car *B*
1933 std. A.R.A. coil springs, Class C	(Not comparable account low speeds)			5,637	6,686	84.3
Old std. A.R.A. coil springs, Class C	8,760	18,721	46.8	(Springs went solid at high speed)		
Barber friction truck springs, Type No. 3	5,475	11,319	48.4	(Retaining bolt broke during test, rendering device inoperative)		
Cardwell friction bolster spring, Type A	1,076	19,538	5.5	677	6,683	10.1
Coil-elliptic springs for conventional trucks	748	21,608	3.5	501	7,045	7.1
Edgewater ring spring truck spring, J-63-K	3,115	16,985	18.3	1,792	7,313	24.5
Frost friction truck spring	10,059	20,389	49.3	4,185	6,701	62.5
Holland volute spring	1,449	17,620	8.3	(Springs went solid at high speed)		
Miner truck spring snubber—Class C-2	2,978	21,660	13.7	1,323	5,428	24.4
National car stabilizer, Type F-2-A	1,172	27,056	4.4	800	6,735	11.9
Barber stabilized truck	901	15,211	5.9	1,170	6,779	17.2
Coil-elliptic springs for double-truss trucks	630	16,796	3.8	283	7,091	4.0
Goodwin car stabilizer truck	(not tested)			865	7,475	11.6
National Type B "Coileaf" truck	1,908	19,416	9.8	481	6,500	7.4

Note 1—This summary is based on average results of one round trip of 37 miles, Rochester to Avon and return. The last four devices are special types of trucks. The others are devices for standard trucks.

Note 2—Car *B* was always equipped with 1933 A.R.A. standard coil springs, Class C. The variation in the lading-damage factors for Car *B* was due in part to the variable influence of the stabilizing device on Car *A*. This influence was apparent when couplers of the two cars were under tension.

Note 3—The low-value lading-damage factors indicate smooth-riding qualities and the high-value factors rough-riding qualities. The table is given for matter of information and not intended to be used as a rating. Complete information will not be available until endurance tests are completed.

Table II—Comparative Summary of Lading-Damage Factors—50-Ton Trucks and True Wheels

	105,000 lb. on rail			168,000 lb. on rail		
	Car *A* test device	Car *B* 1933 std. coil springs	Car *A* per cent of Car *B*	Car *A* test device	Car *B* 1933 std. coil springs	Car *A* per cent of Car *B*
Pennsylvania—Kiesel trucks	472	8.367	5.7	675	4,457	15.1
Pennsylvania—Young trucks	131	6,407	2.1	110	4,952	2.3

Note 1—This summary is based on average results of one round trip of 37 miles, Rochester to Avon and return.

Note 2—Car *B* was always equipped with 1933 A.R.A. standard coil springs, Class D. Do not compare lading-damage factors in Table II with those in Table I.

Note 3—See corresponding note under Table I.

New Appliances for Locomotives and Cars

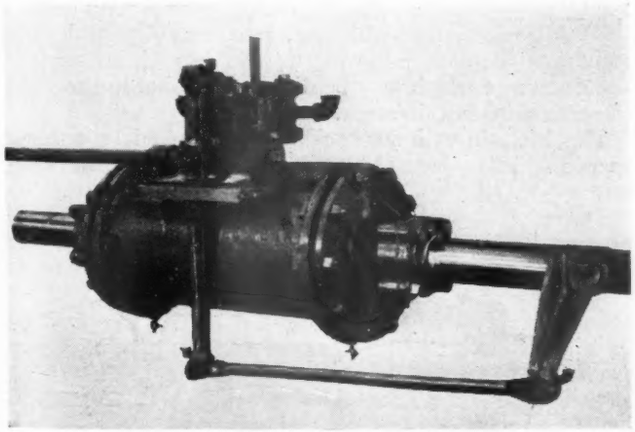
Baldwin Power Reverse Gears

AN improved power reverse gear embodying an adaptation of the Ragonnet principle has been developed by the Baldwin Locomotive Works, Philadelphia, Pa. The valve controlling the passage of air or steam to and from the cylinder is of the rotating, flat-seat type, made of a non-corrosive alloy and provided with a double seal for the exhaust.

A new feature is a separate valve seat which is readily removable so that both valve and seat can be reground at the bench. A change of valve and seat can be made without disturbing the piping or any part of the mechanism, except the valve cover which is held by four nuts.

The operating mechanism includes a centering device which moves the valve to its central position as the piston comes to rest and holds the valve in this neutral position until it is moved by the operator. This decreases the tendency to creep and reduces the amount of air used. The application of a guide consisting of bronze bars bolted to a lug integral with the valve chest prevents vibration of the floating lever, which, if permitted, tends to cause leakage of the valve and wearing of pins and shaft bearings.

The Baldwin gear has separate air and steam supply pipes so that either source of power can be used, non-corrosive ball check valves being provided to prevent



Baldwin Reverse Gear—Trunk Type

steam from entering the air pipes, or vice-versa. A test cock is included so that a steam test can be made without operating the gear.

The new gear is made in two types, one having a crosshead and guides and the other a trunk-type piston rod. The cylinder and valve assembly are identical in both gears.

The crosshead gear, Type C, has the conventional arrangement of guides cast integral with the cylinder head, and a crosshead which carries the reach-rod connection. The piston-rod packing is interchangeable with that of the 11-in. air pump and 8½-in. cross-compound compressor.

The trunk gear, Type T, has the simplicity and compactness desirable for some installations. The piston is guided by an extended piston rod of large diameter, made from double extra strong steel tubing. The piston-rod extension can be omitted if limited space demands a very short gear, but this is not recommended, since the large piston rod gives an overbalanced pressure on the piston which has a tendency to cause the gear to creep.

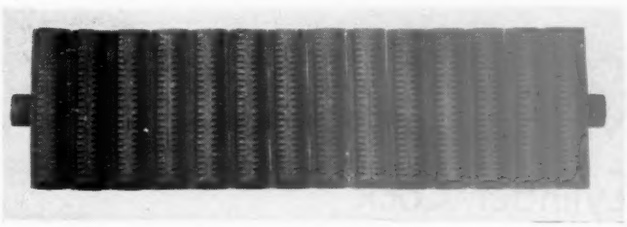
The gears can be assembled in a number of ways—with reverse-shaft connection either forward or backward; with the floating lever inside or outside the cylinder; with the valve mechanism above or below the cylinder. Locating the valve below the cylinder is sometimes desirable when steam is used because of the drainage feature of this assembly.

The hand lever in the cab is of an improved type. The latch has been simplified and the latch guide is made integral with the lever. The lever can be furnished with rod connection either above or below the fulcrum, also with a shaft to offset this connection to clear other parts of the locomotive. The application of a booster latch can be arranged when required.

Unit Type Tuyere Grate Finger Casting

TO reduce the number of castings and overall weight per square foot the tuyere-type grate, made by the Hulson Grate Corporation, Keokuk, Iowa, is now designed with unit-tuyere finger castings. The units are 2¼ in. wide, 9⅞ in. long, for carrier bars mounted on 10-in. centers, and weigh 6¾ lb. each. Compared with 77 to 83 lb. per sq. ft. overall weight for the paired-finger design, the unit castings average 67 to 73 lb. The finger castings alone average 57 lb. for the paired fingers and 44 lb. for the unit castings.

The top surface of the unit is rounded to streamline

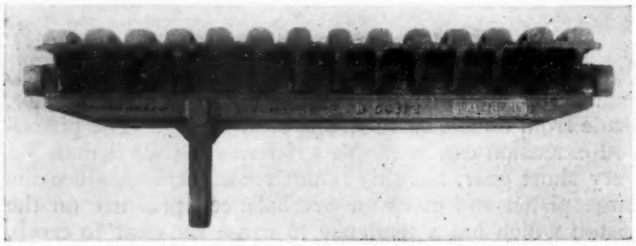


Top View of Hulson Grate with Unit Type Tuyere Finger Castings

the air discharge from the tuyeres and provide a uniform distribution over the entire grate surface. The air delivery is the same as used in the paired finger design, giving a baffled air admission which eliminates tearing action on the fire, an important advantage at high ratings with high firebox drafts. The tuyere openings are made with dry sand cores, giving a clean, uniform passage free from plugging. The air space is controlled by the tuyere opening and permits of accurate proportioning

to suit the locomotive design. The grate illustrated may have a range of from 9 to 20 per cent total air inlet.

Distortion and scaling are said to be eliminated in this design, as the heat absorbed by the top surface is rapidly dissipated through the body of the casting. A



Side View Showing Carrier Bar with Unit Tuyere Finger Castings

larger free opening is provided with the grate in full open position, thus reducing the number of strokes required to dump a fire quickly. Sufficient clearance is provided in the fit on the carrier bars so that the castings can be applied easily. Owing to their greater weight, shaking the gra e loosens any possible corrosion and the castings remain free on the bar.

When making complete applications the frames and carrier bars are installed and connected and the units



View Showing Underside of Unit Tuyere Finger Castings Mounted on Carrier Bar

applied last. Approximately six unit castings are required per square foot of grate surface as compared with 12 and 14 castings of the paired design.

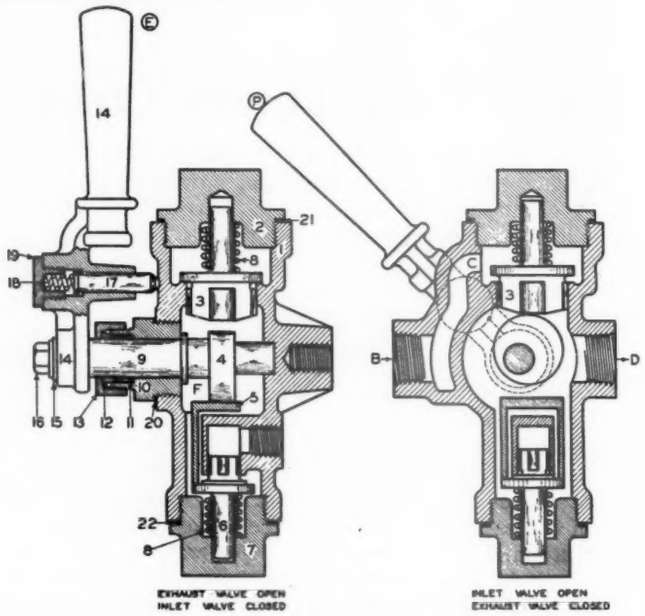
The only direct or straight draft opening is at the ends of the fingers where the maximum opening is ¼ in. As there is no distortion of the casting, this clearance may be kept down without interference developing. Firing-up loss with any size coal is said to be less than ¾ lb. per sq. ft. grate surface. No ash-pan accumulation develops in service.

McLain Locomotive Cylinder Cock

A MAJORITY of the locomotives in this country are equipped with poppet-valve type cylinder cocks which are operated by a series of levers and rods. These cocks seat with the pressure and remain seated until the lever is moved by the engineer, thus raising the poppet valves from their seats and permitting condensation to drain from the cylinders. The objection to this type of cylinder cock is the cost of maintenance of the series of levers, and the fact that if they become bent the cylinder cocks are inoperative.

Some cylinder cocks are operated by compressed air, but the load on the air compressors of modern locomotives is now sufficiently large without coupling another device to it.

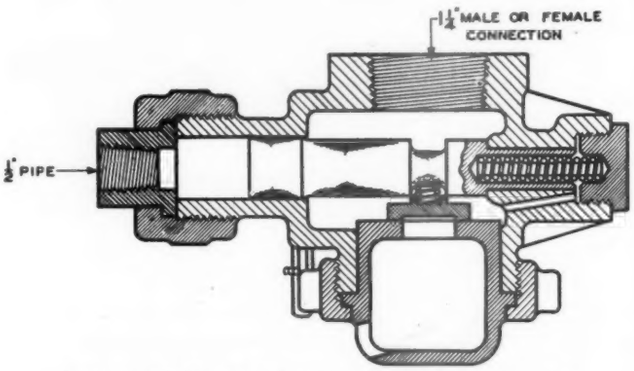
The McLain cylinder cock shown here is made by the United States Metallic Packing Company, Philadel-



Sectional Views of the King Operating Valve No. 51

phia, Pa. It is operated by steam and consists of a piston which moves a slide valve closing the opening from the cylinder to the atmosphere. Among the advantages claimed for the device are the following: (a) Cylinder cocks automatically open when the engine is dead; (b) if cylinder pressure exceeds boiler pressure by 43 per cent, the cylinder cocks open automatically; (c) slide valve wipes the seat, removing dirt and scale each time the cock is operated; (d) full ¾ in. straight line discharge which may be directed parallel to the right of way or in any direction desired.

The McLain cylinder cocks are controlled by a King operating valve No. 51, located in the cab of the loco-



Section through the McLain Locomotive Cylinder Cock

motive, the inlet being coupled to a source of live steam supply and the exhaust piped to the ash pan or some other convenient place where the steam may be exhausted without obscuring the vision of the enginemen.

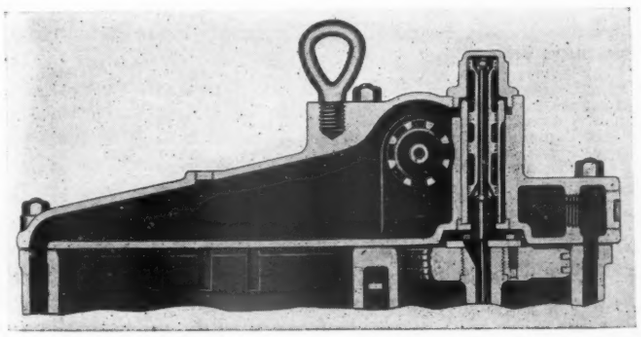
Whenever the handle of the operating valve is in the position marked "closed", steam flows to the ½-in. inlet pipe of the McLain cylinder cock and moves the piston and the slide valve to which it is connected so as to close the outlet from the cylinder to the atmosphere.

When the engineman desires to open the cylinder cocks he moves the operating handle to the position marked "open", whereupon the pressure is shut off from the cylinder cocks and the exhaust valve of the operating valve is opened so as to exhaust the pressure in the line to the atmosphere, whereupon the piston is moved by the spring and the slide valve is pushed across its seat, opening the locomotive cylinders to the atmosphere.

Top Head for Cross Compound Compressors

THAT the 8½-in. cross compound air compressor for air brake service may now be furnished with a new type of top head embodying improvements designed particularly for high temperature and high pressure steam conditions, yet none the less valuable for general use, is announced by the Westinghouse Air Brake Company.

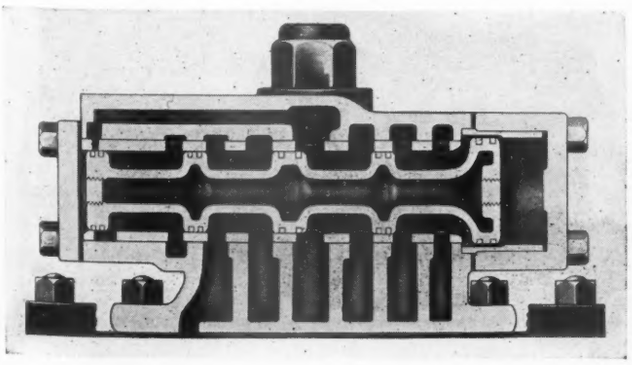
A reversing valve of the piston type replaces the slide valve type. The evils of high friction, intensified by higher steam pressures and temperatures are thereby



Top Head of 8½-in. Cross Compound Air Compressor Showing Piston Type Reversing Valve

eliminated. There is, therefore, less strain on the reversing valve rod, and, since reversing action is positive, better general all around compressor performance is obtained.

The main valve piston is now made in a single casting, instead of bolted segments, to insure maintenance of alignment. The four small pistons are of equal diameter and operate in a single bushing; the former small bushing in the cylinder cover is eliminated, and the large piston bushing is now in the cover. This improved



Top Head of 8½-in. Cross Compound Air Compressor Showing Improved Main Piston

construction simplifies assembly, fitting, and repairs and there is one less ring to stock.

The steam pipe connection can now be made direct to the top head, thus eliminating one of the most common head gasket troubles, i.e., leakage from the steam supply passage into the top end of the high-pressure cylinder. With this arrangement the steam passage in the cylinder is separated from that of the top head by a plug, and the pipe connection for the former left open to avoid possibility of water freezing in the cylinder passage. The present method of connection may still be used, however, by a mere transfer of plugs.

Worthington Type SA Feedwater Heater

THE Type SA locomotive feedwater heater equipment made by the Worthington Pump & Machinery Corporation, Harrison, N. J., is similar to the Type S, but differs from it in certain details, as all three essential parts have been redesigned and improved to secure added efficiency, dependability and economy. In these open-type heaters cold water from the tender is sprayed into the heating chamber where it contacts with exhaust steam from the locomotive cylinders. As the feedwater

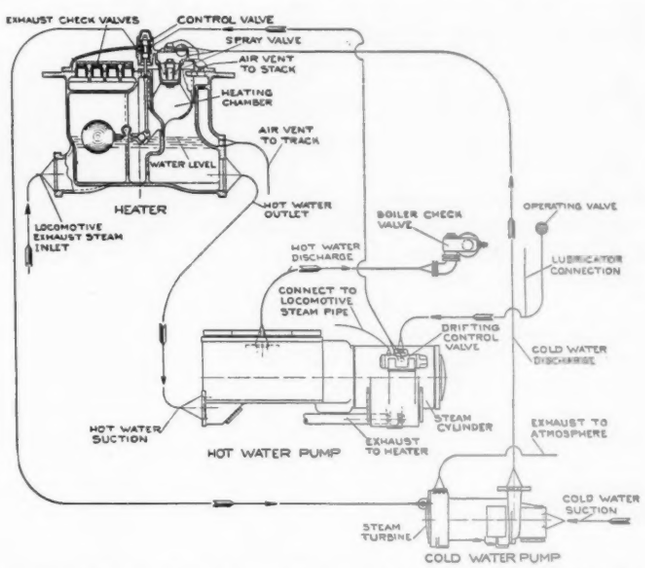


Diagram Showing Circulation of Steam and Water through the Worthington Type SA Feedwater Heater

is heated, oxygen is driven off and escapes through the air vents to the atmosphere.

The equipment consists of three distinct units—the cold-water pump, the heater and the hot-water pump. These independent units are comparatively small and can be located to the best advantage for weight distribution, maintenance convenience, and appearance of the locomotive. The units are shown, diagramatically arranged, in the illustration.

Cold water from the tender is supplied to the heater by a variable-speed turbine-driven low-pressure centrifugal pump located on the side of the frame near the tender. The steam turbine drives the pump at a speed necessary to deliver the amount of cold water required. The heater is set in the smokebox, either in front or back of the stack. Locomotive exhaust steam passes into the

exhaust inlet at the bottom of the heater and through the exhaust check valves to the heating chamber, where it contacts with the cold water which has been forced through the spray valve by the cold-water pump. The heated water flows down through the hot-water outlet to the hot-water pump which delivers it to the boiler. The water level in the heater is controlled by a float-actuated control valve which regulates the speed and capacity of the cold water pump by varying the steam supply to the turbine. The hot-water pump is of the horizontal reciprocating type. It is located as close to the heater and the boiler check valve as practical.

The type SQ equipment has a drifting control valve attached to the steam chest of the hot-water pump. This valve is operated by the pressure in the steam pipe or steam chest of the locomotive. When the locomotive throttle is closed or in the drifting position, this valve automatically reduces the quantity of steam for operating the pumps, thus limiting the amount of water fed to the boiler. The pumps will automatically speed up again when the locomotive throttle is opened. The drifting control valve relieves the engineman of the necessity of closing the pump-operating valve when drifting or making short stops.

The Type SA equipment is furnished in three sizes, having capacities of handling 6,600, 9,000 or 12,000 gallons of water per hour.

Bethlehem High-Speed Auxiliary Locomotive

A MODERN freight locomotive must be capable of developing a large horsepower at operating speeds in order to handle modern trains. Present requirements demand higher speeds as well as greater power. The need for larger boiler capacity is now generally recognized and a locomotive that can meet present demands has ample boiler capacity. The ability to make time on a fast schedule, however, depends not merely upon maintaining a high running speed, but also upon the ability to accelerate a heavy train to full speed in the shortest practical time. At starting and at the lower range of speeds the main cylinders of a locomotive can not, however, utilize the full steaming capacity of the boilers now provided. In order to utilize this surplus boiler capacity at low speeds and thereby add to the starting power and also increase the rate of acceleration, some auxiliary power means must be provided. These facts are by this time quite generally recognized and, consequently, such an auxiliary is properly becoming a fundamental part of any modern locomotive unit.

In order to make available an auxiliary locomotive capable of overcoming the inherent limitations of the conventional locomotive in the lower range of speeds as described and which, in addition, can be used in high-speed freight and passenger train service, a new type of auxiliary locomotive, Series H, has been designed, constructed and thoroughly tested by the Bethlehem Steel Company, Bethlehem, Pa. The illustrations given will serve to show the general construction of the new design while a reference to the table will give a comparison between the Series H and the older Series A and S.

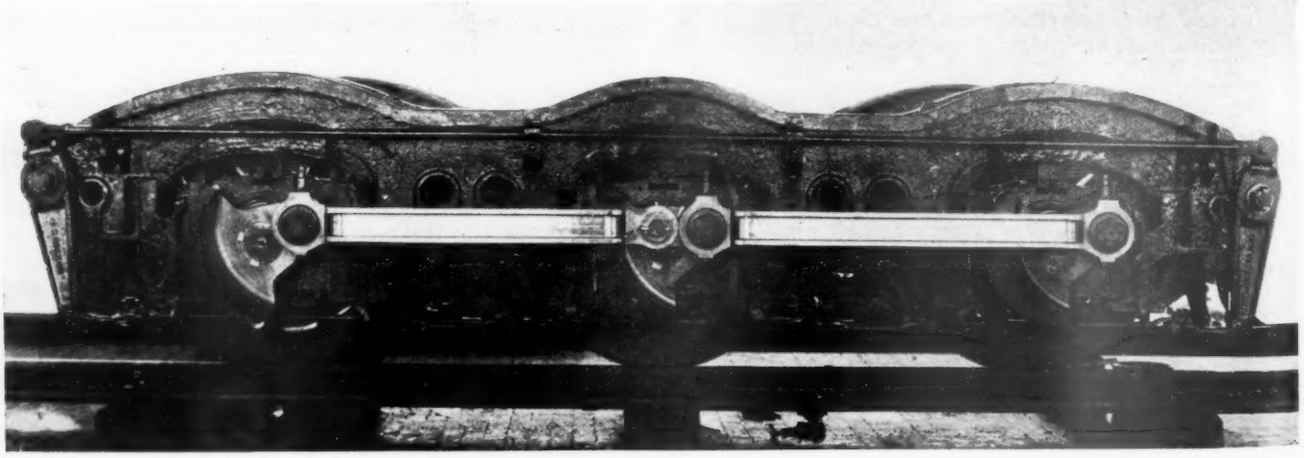
Compared to the older four-wheel Series A and the six-wheel Series S auxiliary locomotives, both having 36-in. wheels, the high-speed Series H machine with 42-in. wheels has slightly lower starting tractive force with the same boiler pressure and slightly greater tractive force beyond a speed of about eight miles an hour. Also, due to the larger wheel diameter and to a reduction in side-rod length from 80 to 60 in., the rod stresses of the Series H machine at any given high speed are slightly less than 50 per cent of the Series A and S machines. As a result of being so proportioned the Series H machine is capable of running at speeds of at least 100 m.p.h. without developing excessive stresses in the side rods or other parts of the truck.

General Data of Bethlehem Auxiliary Locomotives

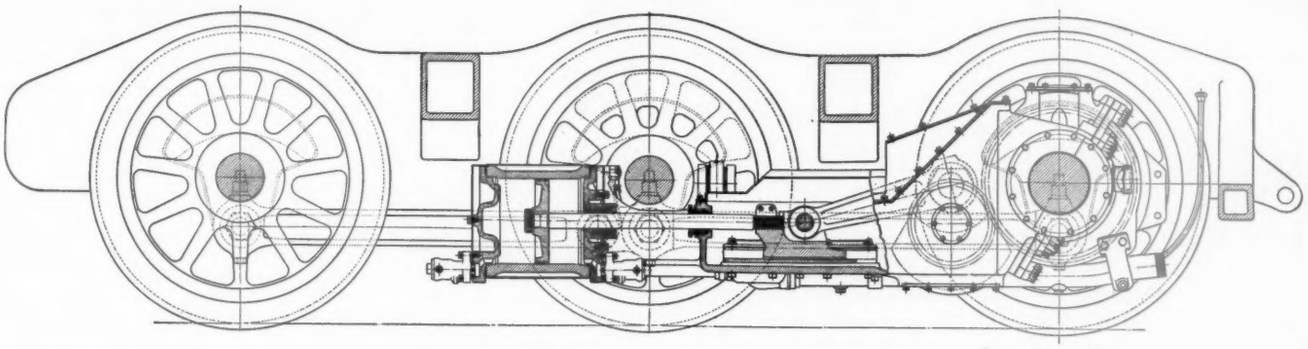
Detail	Older Series A and S	High-Speed Series H
Cylinder diameter, in.	12	12¼
Piston stroke, in.	10	11
Gear teeth:		
a. Driving pinion	16	21
b. Axle gear	36	47
Gear ratio, 1 to	2.250	2.238
Diameter of drivers, in.	36	42
Piston data:		
a. Area, sq. in.	113.10	117.86
b. Displacement, cu. ft.	0.6545	0.7503
Revolutions per mile:		
a. Drivers	560.2	480.0
b. Crankshaft	1,260.50	1,074.24
At a train speed of 1 m.p.h.:		
a. Drivers, r.p.m.	9.34	8.0
b. Engine shaft, r.p.m.	21.01	17.90
c. Piston speed, ft. per min.	35.01	32.82
d. Piston displacement, cu. ft. per min.	27.50	26.86
Cut-off, per cent	70	70
Cylinder tractive force at any train speed	90.0p*	87.96p*

*p is mean effective pressure in lb. per sq. in.

The Series H auxiliary locomotive is mounted on a Commonwealth, fully-equalized, six-wheel, cast-steel



Side View of Bethlehem Series H High-Speed Auxiliary Locomotive for Six-Wheel Tender Truck



Sections of Bethlehem High-Speed Auxiliary Locomotive, Series H, Applied to a Six-Wheel Truck

truck frame, with axles uniformly spaced on 60-in. centers. The wheels are 42 in. in diameter with heat-treated steel tires and S K F roller bearings are provided on all three axles. The brake gear is of the full-floating clasp-brake type. The engine is of the two-cylinder type with piston valves and cylinders 12¼ in. in diameter with 11-in. stroke and coupled to the driving axle at a gear ratio of 21 to 47.

In order to provide the maximum of strength and durability special materials are used for many of the more important parts. For example, the engine frame is of manganese molybdenum cast steel specially heat-treated for high ductility and maximum strength. The side rods and side-rod cranks are nickel manganese steel, heat treated. The engine pinion shaft with integral driving pinion and cranks and other important details are of 3½ per cent high-grade nickel steel, heat treated. Piston rods and valve stems are of stainless steel. Journal boxes and many castings are of electric-furnace steel.

By the use of 42-in., instead of 36-in., wheels a greater maximum wheel load capacity is provided and the number of revolutions per mile is decreased. This, with the shorter rods, makes it possible to use the Series H auxiliary locomotive with any high-speed locomotive at the highest possible speeds. All parts come within the A.R.A. third-rail clearance lines. The design is suitable for application on either the front end or the rear end of the tender.

The auxiliary engine is operatively connected to the driving axle automatically when the auxiliary engine is cut-in and is disconnected automatically when the auxiliary engine is cut-out. The train speed at which the machine can be cut-in or cut-out is limited only by the inadvisability of operating it under steam at a speed beyond which it would not deliver sufficient additional drawbar pull to warrant its use. The control of the Series H auxiliary locomotive is provided for by the two levers of the duplex control valve—one for steam supply and the other for the cylinder cocks. The duplex control valve is so interlocked with the reverse lever of the main locomotive that the auxiliary locomotive can not be cut-in unless the reverse lever is set for forward motion.

Bethlehem Series H high-speed auxiliary locomotives were applied to the tenders of ten 4-8-4 type locomotives built for the Lehigh Valley in the spring of 1932, for high-speed heavy freight service. These locomotives carried a boiler pressure of 250 lb., had cylinders 27 in. by 30 in. and 70-in. drivers. The rated cylinder tractive force of the locomotive itself was 66,400 lb. The tender weighed 398,330 lb. in working order and had a capacity for 20,000 gal. of water and 30 tons of coal. The auxiliary locomotive applied to the rear of the tender had a rated tractive force of 18,360 lb. Tests showed that at starting it added 17,570 lb. to the drawbar pull, 12,540 lb. at 10 m.p.h. and 6,720 lb. at 20 m.p.h.

The performance of these auxiliary locomotives has been excellent A check of the tires on one truck after



Bethlehem High-Speed Auxiliary Locomotive, Series H, Applied to Tender of Lehigh Valley 4-8-4 Type Freight Locomotive

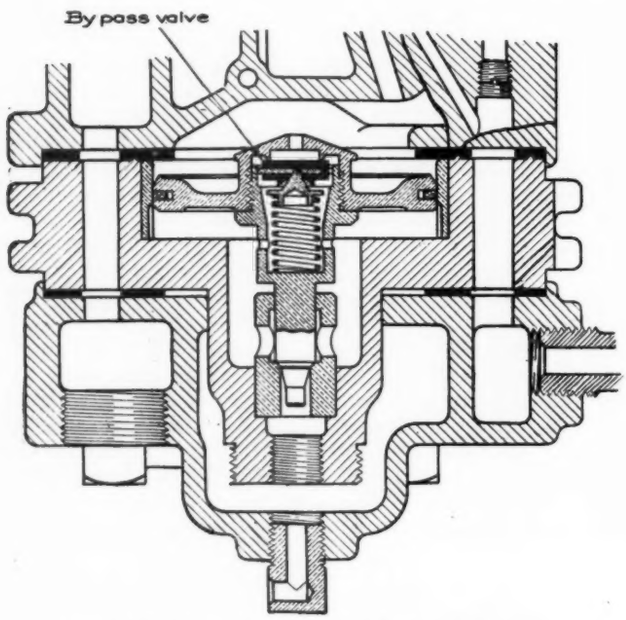
20,000 miles of high-speed service showed less than $\frac{1}{16}$ in. tread wear which was uniform on all wheels. There was no perceptible wear on any of the flanges.

Improved Equalizing Piston for H-6 Brake Valves

AN improved equalizing piston for the H-6 brake valve has been developed by the New York Air Brake Company, 420 Lexington avenue, New York. The piston performs all the functions of the collapsible type equalizing piston and is applicable either to new type brake valves with by-pass grooves, or old type valves without by-pass grooves.

The purpose of this piston, as well as the collapsible type piston, is to relieve any overcharge to which the equalizing reservoir may be subjected so that the equalizing reservoir and brake-pipe pressures may be at or near a balance at all times during the release manipulation of the engineer's brake valve. This is essential for example, in effecting two-application stops.

Referring to the sectional-drawing, it will be noted that a rubber-seated by-pass valve has been incorporated in the piston. This valve is seated upwardly by a



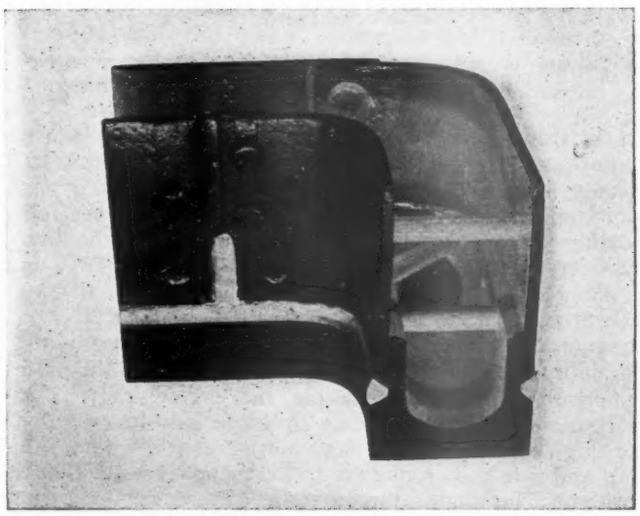
Improved Equalizing Piston for H-6 Engineer's Brake Valve

spring against a seat formed in the piston head. The proportions of the parts are such that should the differential on the opposite sides of the piston exceed 2½ lb., the valve will open and allow the excess in the equalizing reservoir above the piston to flow to the under or brake-pipe side of the piston. The valve is well protected from excessive deposits of foreign substances.

By using this piston it is unnecessary to send brake valves back to the manufacturer to have the grooves put in the piston bushing as is required when collapsible pistons are applied. Furthermore, there is no possibility of the piston head sticking below the by-pass grooves and making it impossible to effect a service application. The improved piston never uncovers these grooves even though this type of piston is substituted for one of the collapsible type.

Wilson Firebox Mud Ring

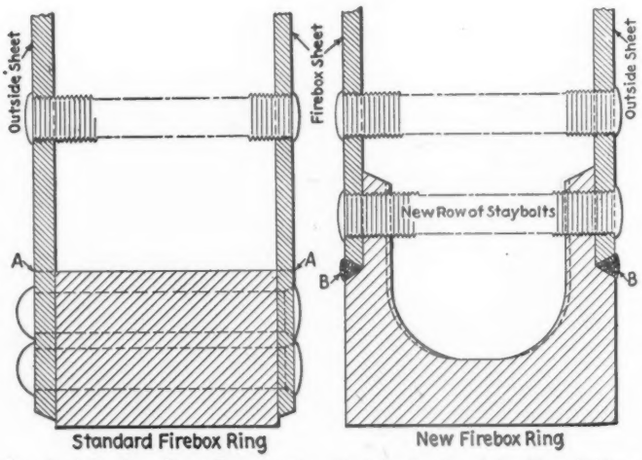
WHILE many of the details which enter into the construction of a locomotive boiler have been materially improved in design and material, the lowly firebox mud ring has thus far been passed by, apparently without a thought as to its possible improvement. It has remained of essentially the same construction as that used in the very early boilers of what is known as the locomotive type and seems to have been considered as nothing more than a filling piece between



Model of Wilson Firebox Ring Showing Corner Construction and Method of Joining Mud Ring and Firebox Sheets

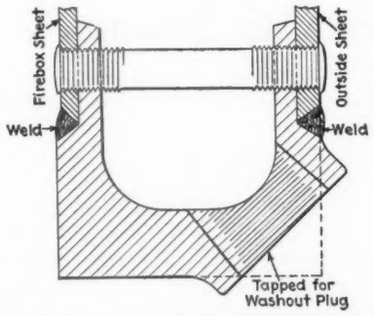
the inside and outside firebox sheets, through which the rivets pass that are necessary to resist shearing stresses and to make the required joint. All railroad boilermakers know, however, that the ordinarily used rectangular cross-section mud ring may be the cause of much grief from leaky rivets, cracks between the rivet holes and erosion of the scarfed edges of the sheets resulting from such leaks.

An improved mud ring here shown has been developed and patented recently by George M. Wilson, chief boiler inspector of the American Locomotive Company. Instead of the solid rectangular cross-section to which the sheets are riveted, this new mud ring is of U-shape in cross-section, the rivets being done away with and the connection between the inner and outer sheets made by means of a new bottom row of staybolts. The lower



Standard Firebox Ring Construction (Left)—Replaced by New Wilson Ring (Right)

edges of the sheets are welded to the shoulders formed by the set-back in the outer vertical flanges of the cast-steel ring. This welding is not relied upon at all for strength, but merely serves to seal the edges of the sheets to the mud ring. It has been the practice for some time to weld the edges of the sheets to the ordinary rectangular mud ring for a short distance from each firebox corner and some railroads require this sealing weld to be carried all the way along the edges of the



Sectional View of Wilson Mud Ring Showing Corner Location of Washout Plug and Method of Attaching Mud Ring to Firebox Sheets

sheets. Therefore, such welding is not a new suggestion.

Another feature of merit in the Wilson mud ring is the arrangement of the washout plugs in the corners. Instead of being horizontal, they angle downwardly, giving a much better outflow when washing-out. Lugs for attachment to boiler supports are the same as commonly used.

This improved construction offers the advantages of a considerable saving in weight, while providing a more uniform distribution of metal in the casting, and thereby reduces the hazard of foundry losses. It has sufficient flexibility to adapt itself to the expansion and contraction caused by the changes in boiler temperature, and at the same time is of ample strength to withstand all shocks and strains of service.

While designed primarily for new locomotives where a saving in weight is always an advantage, there are many cases where it might be applied to existing boilers. This is accomplished by cutting or burning off the outer and inner firebox sheets just above the mud ring at points *A* indicated in one of the illustrations. The sheets are then beveled, the new type of mud ring applied with an added row of staybolts, and the welds made at points *B*. The older lower row of staybolts remains untouched.

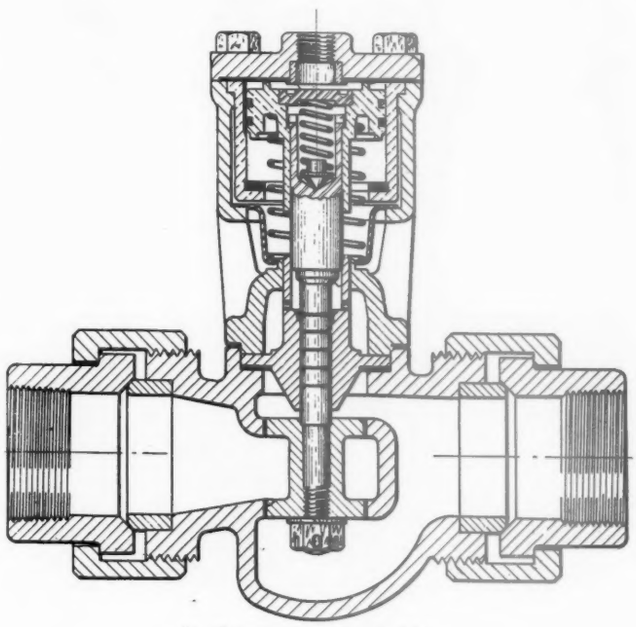
Steam Throttle Valve for Air Compressors

TO prevent racing and protect air compressors against damage when operating at low main reservoir pressure the New York Air Brake Company, 420 Lexington avenue, New York, has designed a special throttling valve which is inserted between the turret valve and the governor in the steam supply line leading to the air compressor on the locomotive. The function of this valve is to restrict the flow of steam to the pump at times when the main reservoir air pressure is extremely low, or during the start of charging the main reservoirs.

When charging is started in the main reservoir should there be an absence of air therein and full steam pressure is permitted to flow immediately into the air compressors, there is a tendency for the compressor to race due to the absence of an air cushion under the pistons. Oftimes the pistons are forced so hard against the end of the air cylinders that the piston heads become loosened from the piston rods, resulting in a pump failure. To eliminate this it is proposed to restrict the flow of steam to the compressors until such time as the main reservoir air pressure is built up to a predetermined pressure, for example 40 lb., at which time a suitable air cushion behind the air pistons is established to permit full steam throttle opening without damage to the compressor operating parts.

Referring to the drawing, the left-hand opening of the lower portion is connected to the steam supply and the right-hand opening to the air compressor. Between these openings a plug valve is interposed. This valve is attached to a valve stem which is collapsibly connected to a piston in the upper part of the throttle valve, the space above the piston being connected to the air pipe leading from the main reservoir to the high pressure top of the duplex pump governor. While the pressure in the main reservoir is low, all parts are in the position shown and the flow of steam to the air compressor is restricted to the amount that can pass the loosely fitting plug valve.

As will be noted, the piston is provided with a sealing rim on its upper face which seats on the top gasket so that only the surface inside of the rim is subjected to air



Air Compressor Throttle Valve

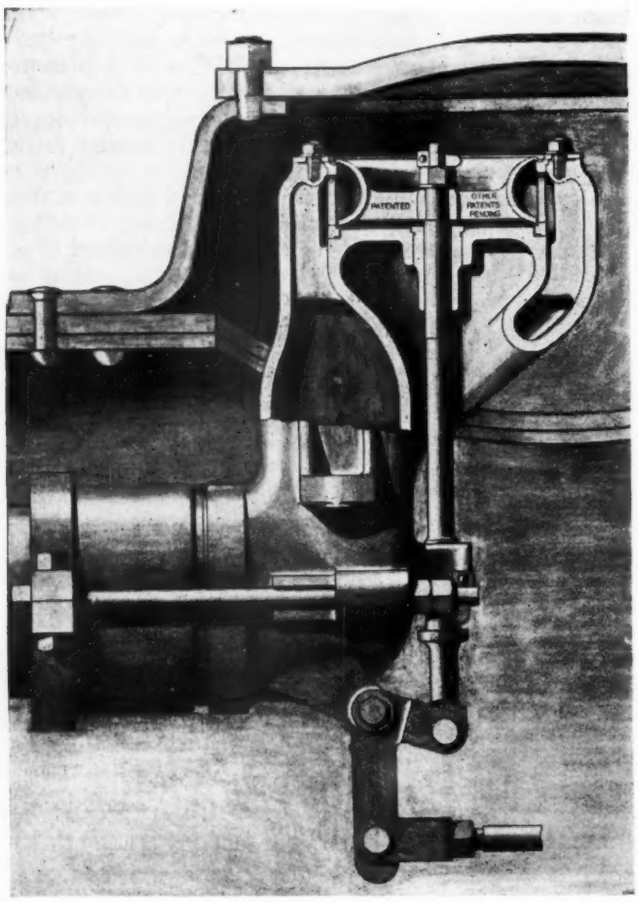
pressure. When main reservoir pressure reaches about 40 lb., the piston is forced down against the resistance of the outer spring and opens the plug valve. As soon as the piston starts downward and the rim seal is broken, the effective area is increased to that of the full piston diameter. The piston will now make its full stroke, overcoming the resistance of both the outer and inner springs and seat itself against the gasket in the bottom of the piston chamber and thus prevent any leakage from the main reservoir to the atmosphere below the piston. The piston and valve stem being collapsibly connected, the downward movement permits the enlarged portion of the valve stem to seat against its guide and form a seal against steam leakage past the lower part of the valve stem to the atmosphere.

When operating against low reservoir pressures, the

pump is limited to 40 to 45 cycles per minute and when the throttle valve opens, the speed is immediately increased to say 80 to 90 cycles.

Glaenzer Poppet-Valve Throttle

AN improved throttle valve of the poppet type is now being made by the Baldwin Locomotive Works, Philadelphia, Pa. It is anticipated that the poppet valve will remain steam-tight under high temperatures and pressures. The valve and cage are of heat-treated, corrosion-resisting alloy steel. The valve-



Sectional View Showing Construction of Glaenzer Throttle Valve for Typical Dome Application

rim sections are of light construction, permitting expansion and contraction under fluctuating temperatures without disturbing the steam-tight seal at valve and cage seats, thus reducing the cost of repairs chargeable to leaky throttles and avoiding the troubles resulting therefrom.

The construction is simple and but few parts are required. The valve is easy to operate because the small sections of the seats give a greatly reduced overbalanced area. The valve itself is light, weighing about half as much as a conventional throttle valve. No pilot or starting valve is required.

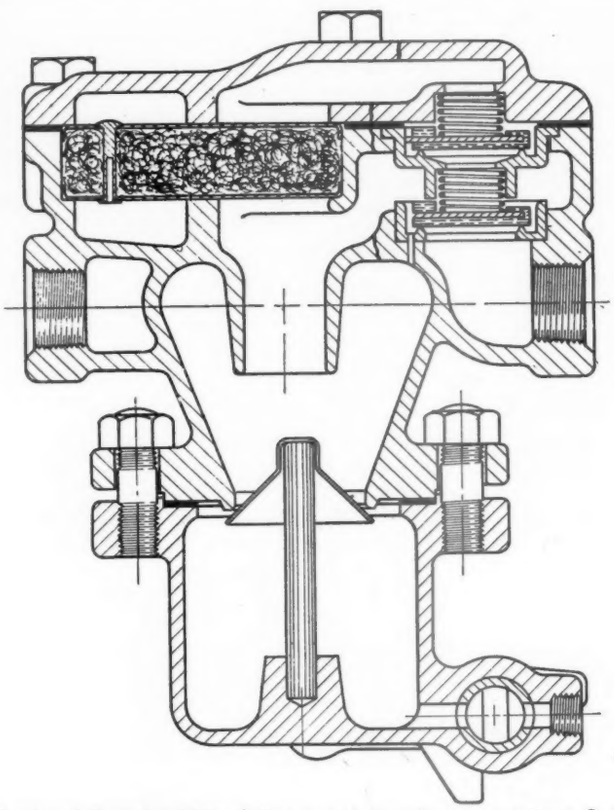
The valve seats are conical and are ground with the projections of the angles of the top and bottom seats meeting at a common point on the center line, thus minimizing the effect of unequal expansion and contraction.

The lifting of the valve from the seats allows it to rotate freely on the stem, resulting in a self-grinding feature. This type of throttle can be applied either in the dome or the front end.

Centrifugal Dirt Collector with Strainer

SEVERAL designs of centrifugal dirt collectors with quick discharge features have been used in the past, the objectives in all cases being the quick and complete discharge of dirt and condensed moisture from the dirt chamber at the bottom of the device. In one early form it was necessary to close the cut-out cock in the branch pipe before the discharge valve was opened to prevent an emergency application of the brakes. In a later form the cut-out cock was incorporated in the body of the centrifugal dirt collector and its handle so interlocked with the discharge valve that the cut-out cock would be closed before the discharge valve was opened and the valve closed before the cock was again opened. In another design the opening of the discharge valve was so restricted that emergency action of the brakes would not take place.

A new design of centrifugal dirt collector has been developed by the New York Air Brake Company, 420 Lexington avenue, New York. The body has been changed to accommodate a strainer and the plug-type cock has been incorporated in the dirt chamber, as shown in the drawing. This cock is normally closed, handle horizontal. A quick draining of the dirt chamber is accomplished by moving the cock handle upward to its vertical position. This moves the plug cock to its open position and allows brake-pipe air to vent to the atmos-



Combined Centrifugal Dirt Collector with Hair Strainer and Drain Cock

phere through a sufficiently restricted opening to prevent initiating serial emergency action.

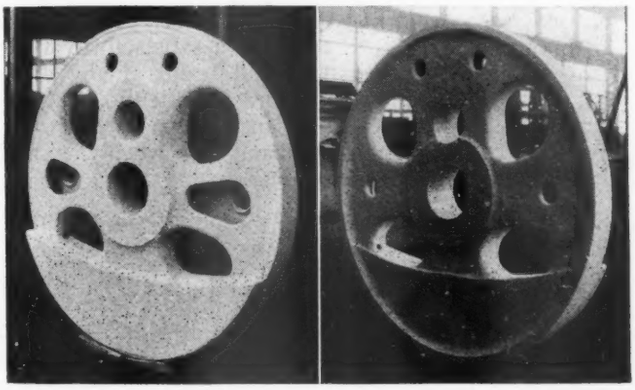
A strainer is inserted in the current of air as it passes through the dirt collector and after the centrifugal section of the dirt collector has been brought about. Should the strainer become clogged, the check valve opens, permitting the dirt collector to function normally without the action of the strainer. The curled-hair strainer provides a means of carefully cleaning the air and can be removed for cleaning and renewal.

Boxpok Locomotive Driving-Wheel Center

THE improved cast-steel locomotive driving-wheel center illustrated has been designed particularly to meet modern operating requirements and is now in service on a number of railroads, being adapted for application on both new and existing locomotives. It is manufactured by the General Steel Castings Corporation.

The Boxpok (box spoke) driving-wheel center, as the name indicates, is characterized by having box-section spokes instead of spokes of the usual solid type. In addition, it has a rim of box section. The better and more economical distribution of metal made possible with this design provides greater strength with less weight and also enables the foundry to produce superior castings.

The box-section rim construction, with supporting walls on both sides, has much greater strength and a



Two Views of the New Boxpok Cast-Steel Driving-Wheel Center, As Designed for 68-In. Main Wheels

more uniform tire support and is designed to prevent the development of out-of-round wheels and flat spots. This should increase tire mileage and reduce wheel maintenance. The Boxpok design also has greater strength to resist piston thrusts, lateral forces and impacts from rail, as well as an improved construction between the crank-pin hub and the rim.

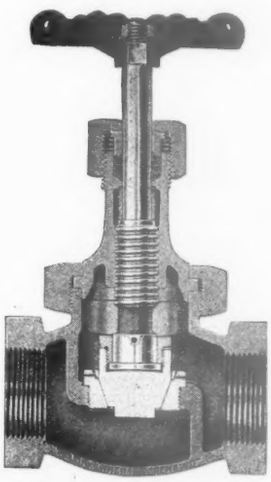
The large openings provided in this wheel center give greater accessibility for application and removal of parts, inspection of spring rigging, and lubrication of driving boxes, pedestal shoes and wedges.

The Boxpok design of wheel, with its better utilization of metal, makes it possible to cross balance and to improve counterbalance conditions. In the case of many locomotives now in service, this better balancing permits higher speeds with less wear and tear on the locomotive and track.

In the development of the Boxpok driving-wheel center, the General Steel Castings Corporation has had the collaboration of the American Locomotive Company and the American Steel Foundries.

Plug-Type Renewable-Seat Valves

FOR severe service demanding maximum resistance to destructive action on valve-seat bearings the Lunkenheimer Company, Cincinnati, Ohio, has developed a new line of valves with plug-type NS5 alloy seats and discs which are known by the trade names Renewo and Ferrenewo. NS5 alloy is a new Lunkenheimer development which is said to be a non-galling, non-ferrous composition of great hardness (300 Brinell), resistant to



Valves with Special Alloy Plug and Valve Seat

wear, abrasion, erosion and corrosion, and retains its hardness at high temperatures.

These plug-type valves are made with deep-seated plugs, each plug being ground into its own seat to a uniform bearing from end to end, thus insuring a leak-proof fit. Iron-body bronze-mounted Ferrenewo plug-type valves are made for 150-lb. steam pressure, while the bronze Renewo valves are available in both 200 and 300-lb. steam pressure patterns. Excepting bodies and bonnet rings, all parts of Ferrenewo and medium Renewo valves are interchangeable; hence, it is necessary to carry but one stock of parts for both valves. This interchangeability feature likewise applies to the various patterns of extra-heavy Renewo valves.

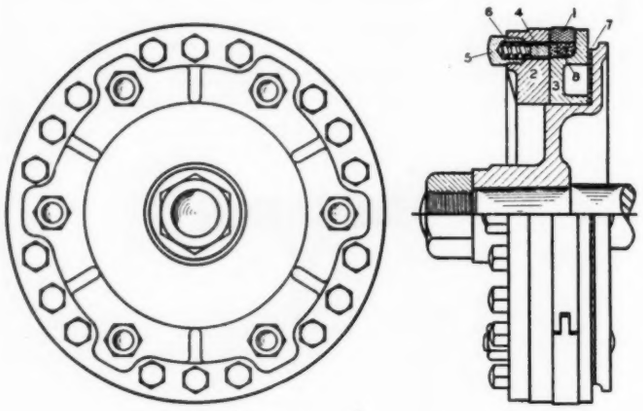
King Cylinder Packing for Power Reverse Gears

THE packing ordinarily used in power reverse gears is of the molded cup form, the cup being composed of asbestos and rubber which is formed into shape and the rubber then vulcanized.

Some time ago the Interstate Commerce Commission issued an order to equip power reverse gears with steam connections. The object of this order was to secure added safety so that if there should be a broken air connection to the power reverse gear it could still be operated by steam to reverse the valve motion. By reversing the engine and closing the throttle the main cylinders of the

locomotive would act as air compressors and the resistance thereby set up would in course of time bring the locomotive to a standstill. Since steam connections have been applied to power reverse gears, there have been a number of engine failures brought about by the emergency use of steam in these gears, which has the effect of disintegrating the molded rubber and asbestos cups.

To meet this situation the United States Metallic Packing Company, Philadelphia, Pa., designed the King



King Packing for Reverse Gear Cylinders

cylinder packing shown herewith. Ordinarily no alterations are made in the piston head, but the existing molded cups, bull ring and follower are removed and discarded. In their place is applied gasket *7*, bull ring *3*, and King cylinder packing ring *1*. Three turns of soft fibrous packing are then applied in the cavity left between the King cylinder packing ring *1* and the bull ring *3*. This fibrous packing is made of pure asbestos—no rubber enters into its composition—so that there is nothing to deteriorate from the effect or temperature of the steam. Follower *2*, with expander *4* in place, is now fitted over the studs which held the former assembly in place, nuts are applied to the studs and drawn up tight. Springs *6* and caps *5* are inserted and pulled up tight. These springs exert a constant pressure on the fibrous packing and prevent leakage of pressure between parts *1* and *2*, and between parts *1* and *3*, and also provide a resilient body to support the King packing ring *1*.

Improvement in Journal-Box Lids

THE No. 3 Asco A.R.A. special self-fitting torsion-spring journal-box lid made by the Allegheny Steel Company, Brackenridge, Pa., has several new features added to the regular Asco lid which makes it particularly suited for use with the modified journal boxes adopted and revised by the A.R.A. Mechanical Division in 1932.

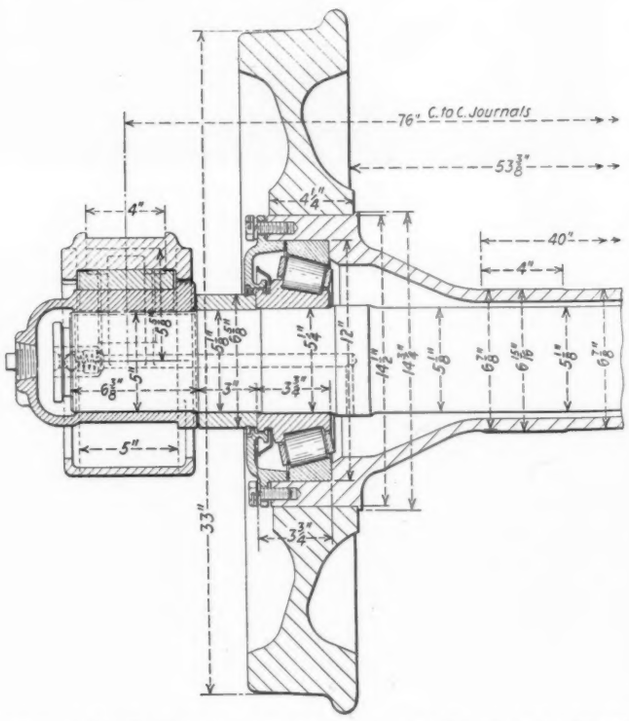
The new lid is provided with a continuous flange of ¼ in. and more without any breaks or recesses that will allow brine drippings, water, dirt, or foreign substances to enter the journal box. Another feature is the new form of the hood or spring retainer. The lever end of the hood is so designed as to simplify application and is of a form which will prevent inspector's hooks from catching under the hood. The upper portion of the hood has also been redesigned to allow brine drippings or water to flow on the front of the lid rather than on top of the journal box or into the side of the lid.

Roller-Bearing Unit for High-Speed Trains

A ROLLER-BEARING wheel-and-axle unit, embodying the use of Timken roller bearings, has been developed by the American Steel Foundries, Chicago, for use on light-weight high-speed trains. This unit is an adaptation of the same principles successfully demonstrated in the A. S. F. roller-bearing unit which has been giving satisfactory service under standard passenger and tender equipment for approximately five years.

The improved design takes advantage of the reduced overhang from the bearing seat to the center of the journal, thus effecting a considerable reduction in axle stresses and permitting the use of a light-weight design without any sacrifice of strength. In addition, the design incorporates the journal-box construction, illustrated, which not only decreases the weight of these parts as compared to standard journal box, brass and wedge, but makes possible a saving in the truck side design on account of the smaller pedestal opening required.

The particular features of the new A.S.F. roller-bearing design are as follows: (1) It permits the use of as large a roller bearing as is required without increasing the weight of other parts or interfering with truck clearances; (2) it offers a stronger axle construction than friction bearings; (3) it allows positive control of lateral motion between the truck side and the wheel-and-axle assembly to the exact amount required and permits free and unrestricted movement within the desired lateral range. The bearing is designed to operate satisfactorily under light-weight, high-speed passenger trains at any speeds that are now contemplated, requiring attention only for periodic oilings and bearing inspections when wheels are removed for turning or changes or when the car is shopped for general overhauling.



A.S.F. Roller-Bearing Unit for Use on High-Speed Light-Weight Equipment Having 5-In. Journals

Covered Hopper Cars Class L O

IN anticipation of the modern trend toward bulk transportation of commodities heretofore carried in bags, boxes, barrels, etc., the American Car & Foundry Company has designed a line of all-steel roofed-over hopper cars for handling shipments of cement, flour, lamp black, fullers earth, etc.

The car shown in the illustration was designed primarily for the transportation of cement in bulk, and has been in the service of cement companies in the East and Middle West for about two years for the transportation of cement to dams, concrete buildings, road construction projects, etc., at a very low cost. One of the largest cement producing companies has figured a saving in one trip of $90 in bags alone to say nothing of the saving in handling cost.

The car is of 70-ton capacity, all-steel construction, the inside surfaces of the hopper compartment being perfectly smooth due to the use of fusion welding at all joints, the joints after welding being ground to a smooth finish. Rivets are not used in the construction of any part of the hopper compartment which comes in contact with the lading.

All slope sheets in the hopper compartments are set at an angle of not less than 50 deg. This insures a free flow of the lading when discharged. Air vents are provided at points where air pockets usually form during the loading operation. The car is divided into two hopper compartments by a transverse bulkhead extending completely across the car from side to side and is fitted with four rectangular discharging outlets, two on each side of the longitudinal center line. Each outlet is fitted with a cast steel frame welded to the hopper sheets. Sliding gates are opened or closed by means of a jack screw mechanism. The hopper gates operate at right angles to track, but a later design provides operation of these gates parallel with the track, by means of miter gears operated from outside the car.

The car roof is all-steel, carried on steel carlines and fitted with loading hatches, the frames of which are welded to the roof; hinged hatch covers, flanged downward on all sides are provided, this construction preventing entrance of water into the lading. The hatch covers are fitted with locking hasps and sealing devices. Running boards are provided on the roof of car extending from end to end and meeting all requirements of the A.R.A. and of the I.C.C. in relation to safety appliances.

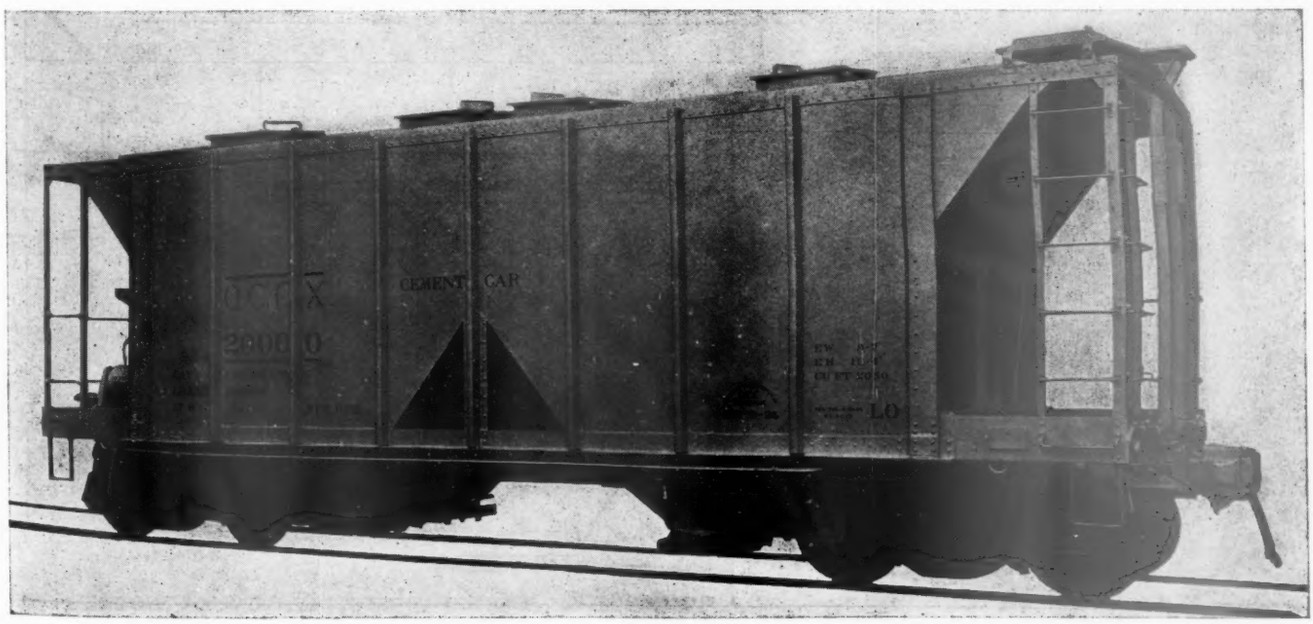
Trucks are of the cast steel side frame, integral box type with 6 in. by 11 in. journals, coil-elliptic bolster springs and wheels of a.c.f. make—850 lb. A.R.A. single-plate chilled flange and tread.

The air brake is the AB type, operating mechanism being located on the end of underframe under the slope sheet. Geared hand brakes are provided. The car body is painted with aluminum and lettered in black.



Top View Showing Loading Hatches of Bulk Cement Hopper Car

Discharging into a canvas boot leading to a screw conveyor of 150 barrels per hour capacity, the car can be completely discharged in two hours, one hopper compartment being discharged at a time. The car has been completely discharged in twenty minutes when unloading into a large chute feeding a barge and using all four hopper openings simultaneously. In each unloading operation the car has been completely self-clearing, little or no poking being required and less than a bushel of cement remaining in the hoppers. That the car is com-



Covered Hopper Car for Bulk Shipments of Cement

pletely water-tight has been demonstrated by a number of trips during severe rain storms.

The principal characteristics of the 70-ton car are:

Length inside	29 ft. 3 in.
Length over strikers	35 ft. 1¾ in.
Center to center trucks	25 ft. 3 in.
Truck wheel base	5 ft. 8 in.
Width inside	9 ft. 5½ in.
Height—rail to top running board	12 ft. 10⅝ in.
Height—rail to eaves	11 ft. 10 in.
Capacity	2,050 cu. ft. (415 barrels, 378 lb. per barrel)
Light weight	53,100 lb.
Load limit	156,900 lb.

Similar cars of 50-ton capacity are also available.

Another design of covered hopper car recently built by the American Car and Foundry Company is adapted for handling carbon black. This car is divided into three compartments, has an inside length of 40 ft. 10½ in., a load limit of 86,000 lb., a capacity of 3,000 cu. ft. and weighs 50,000 lb. light.

Malleable-Iron Hopper-Car Door and Frame

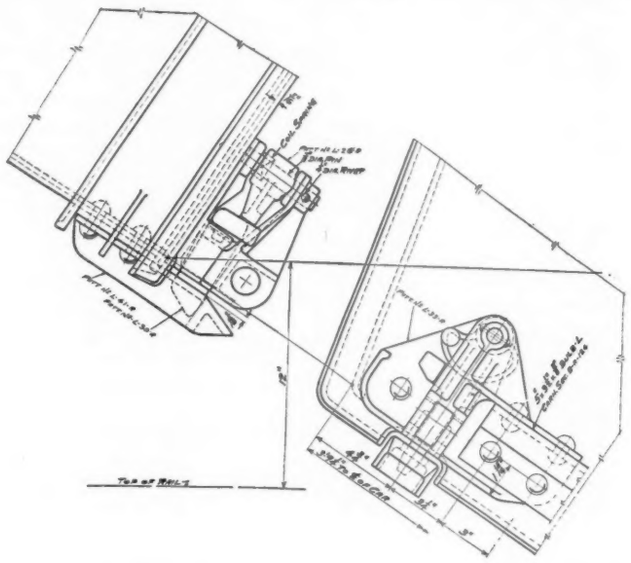
THE Fort Pitt Malleable Iron Company, Pittsburgh, Pa., is offering a malleable-iron hopper frame, door and door lock for railway hopper cars.

The Fort Pitt malleable hopper frame provides a rigid and permanent construction around the entire hopper opening. The frame and door as a unit incorporates hinges and integral door-strap fittings in proper relation to eliminate a mis-fit application.

As will be observed from the illustration, the door is provided with a flange which overlaps the flange around the hopper opening, thus making possible the hauling of pulverized coal and other fine materials reasonably immune from lading loss. The total weight of the unit compares favorably with that of the conventional built-up design. The frame is of four parts: Two sides, one top and one bottom member, riveted together at the foundry to provide a permanent assembly before shipment, thus reducing to a minimum the handling of several parts incident to the built-up design.

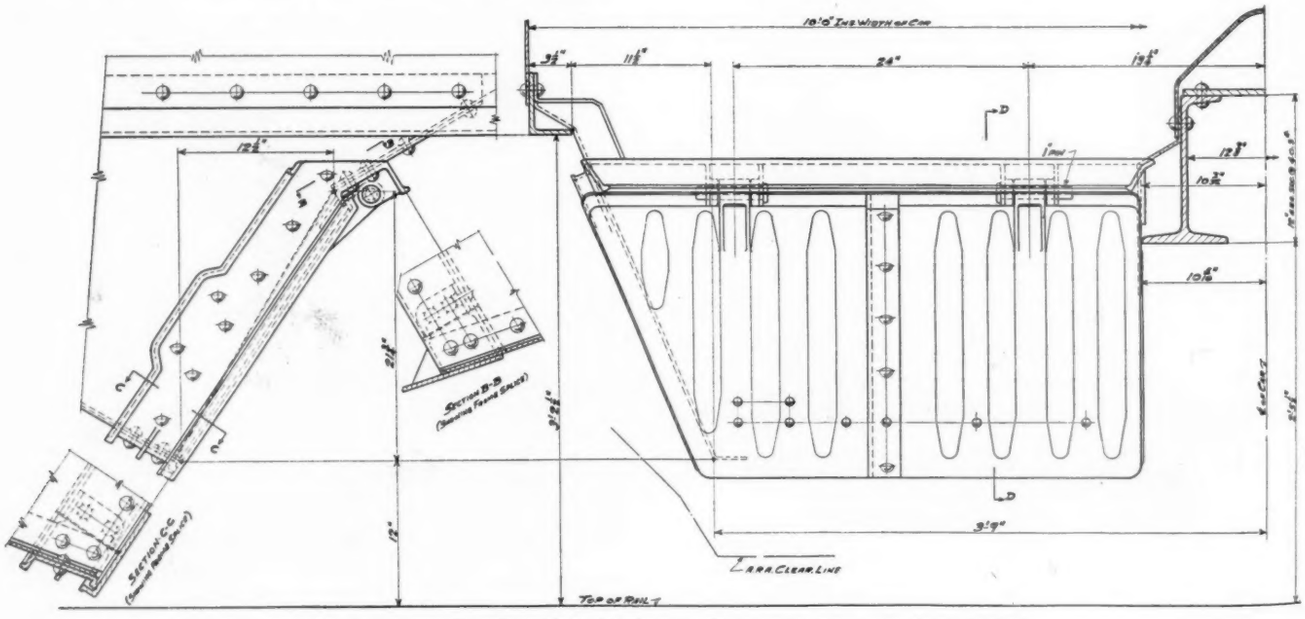
The Fort Pitt malleable positive door lock is designed for safety in operation, strength and simplicity. As a complete unit it consists of only four castings and its total weight is small.

The locking device, being located near the bottom edge of the door in conjunction with the door spreader, provides door stiffener the entire length of the bottom closing edge. This also permits the use of a shorter door spreader than is generally used and reduces the weight about 15 lb. per spreader. In addition, the lock is placed in line with and well above the bottom of the truck side frame, thus maintaining a maximum clearance above the rail line, as well as meeting all other clearance requirements. It is also free from third-rail interference.



Application of Fort Pitt Door Lock to Hopper Car Equipped with Malleable Iron Hopper Frame and Malleable Iron Door

The latch assembly is a positive, one-position lock and, when first engaged with the keeper, sufficient clearance between the door and hopper is obtained to allow for any reasonable warpage that may exist in the door. The latch, then driven to its lower position, forces the door home against the hopper opening. The wedge action of



Application of Fort Pitt Malleable Hopper Frame and Door to a Hopper Car

the latch holds the door in a tightly closed position, serving also as an automatic take-up for any wear which may develop through use. The latch pawl provides security under all conditions, thus obviating disengagement of the lock due to vibration or otherwise when in rotary dump service.

Wine Truck Brake Balancer

THE foundation brake rigging on by far a great majority of present freight equipment embodies essentially the same general principles utilized in the earliest brakes and introduces an unbalanced condition due to securing the dead lever to an eccentric location on the truck bolster. The introduction of this brake reaction on this movable car part results in a number of detrimental effects, both in the truck parts and the functioning of the brake, as well as creating a potential hazard in the operation of cars under certain conditions. The brake force, applied to an eccentric point, tends to rotate the truck as well as to create an out-of-square condition. Even should the truck be so constructed as to remain perfectly square, its normal resistance to swiveling causes increased flange-to-rail pressure which may greatly exceed the pressure caused by unbalanced brake action due to the attachment of the dead lever to an eccentric location on the truck bolster. This results in a more or less serious hazard to safe operation.

Summarizing, the apparent results of the eccentric location of the brake reactions and the unbalanced forces are : (1) Increased wear to wheel flanges, wheel treads, axle collar and associated parts, due to the truck's being swiveled; (2) undue wear on side frames at the bolster guides and to the bolsters at the guides, on the faces through which the unbalanced brake forces are transmitted; (3) variation in braking forces when the trucks swivel under cars, also transverse loads on brake beams and additional loads on brake hangers for certain positions of the dead lever fulcrum; (4) a tendency to derail when the brakes are applied, particularly under a light car where the brake ratio is maximum and when the flange and rail conditions are conducive to the wheel flanges climbing the rails.

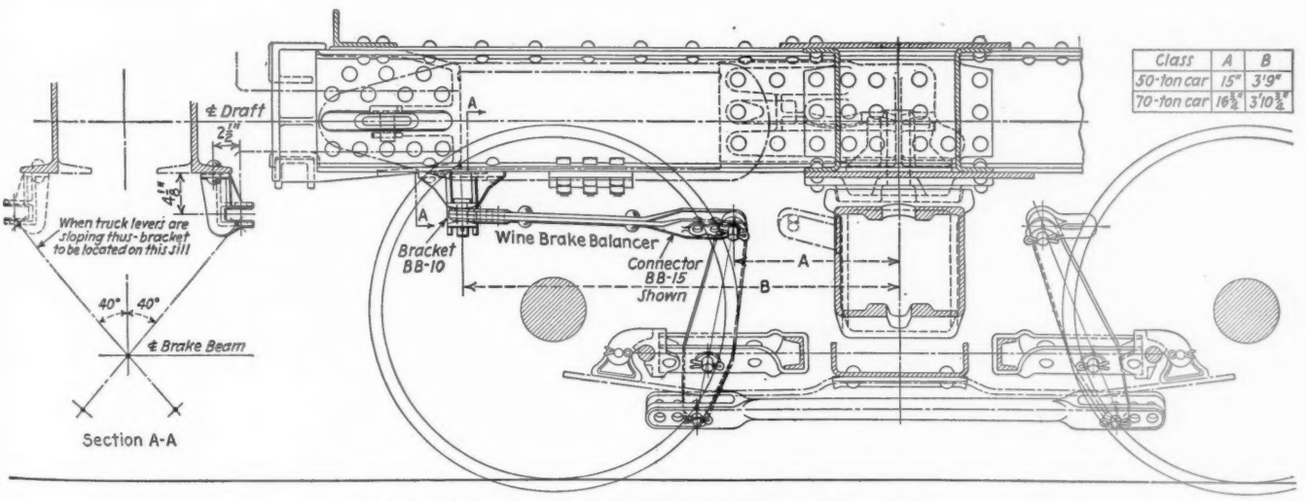
To overcome this condition and to relieve the trucks of this unnecessary wear and unbalanced reaction, the Wine Railway Appliance Company, Toledo, Ohio, has developed the Wine brake balancer which is illustrated. This device comprises essentially a bracket riveted to the car underframe and a balancer connector rod which engages the upper end of the dead lever by a three-position pin-and-clevis arrangement. The use of this device avoids the necessity of connecting the upper end of the dead lever to an eccentric location on the bolster as is customary practice. With the Wine balancer bracket and connectors, the brake reactions are returned to the underframe of the car where they were originated by the brake cylinder, thereby relieving the truck of all the reactions of the brakes other than the necessary functions of retardation. The construction of the Wine brake balancer is apparent from the drawing and it is said to be applicable to any standard type of freight car, offering no new problems in brake adjustment for shoe wear. The fundamental dimensions of the brake balancer application to the A. R. A. standard 50- and 70-ton capacity cars are those indicated in the drawings.

Discharge Gates for Bulk Cement Cars

THE growth of the use of ready mixed concrete, or batch mixed concrete, has made it necessary for several railroads to provide special cars for a more satisfactory handling in bulk of the required cement. The majority of these cars have been converted from 55-ton, twin-hopper, coal cars by the addition of a water-tight roof provided with covered hatch openings. Interior bulkheads are also fitted to limit the cubical capacity to suit the increased weight of cement, which averages about 85 lb. per cubic foot as loaded. The hoppers are modified from the usual door arrangement to that of special discharge gates which are suitable for use with the type of conveying system employed in unloading this material.

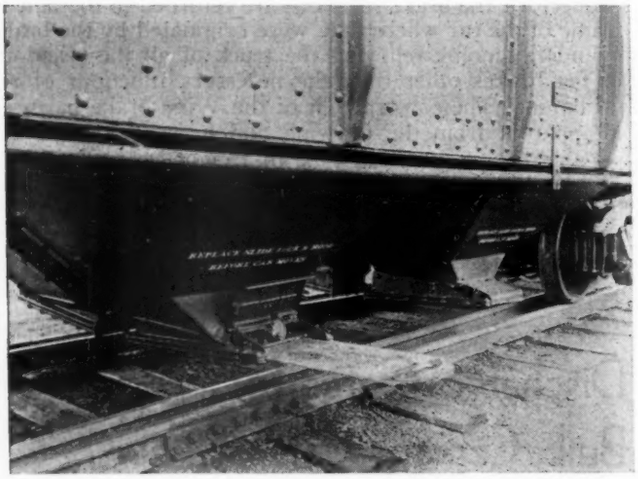
Certain railroads are also converting some box cars for the handling of bulk material, fitting them with covered roof hatches and with hoppers below the flooring, the discharge gates for these hoppers being similar to those used on the hopper type cars.

The Wine Railway Appliance Company, Toledo, Ohio, has developed for these types of cars a discharge gate having an electric steel casting frame which extends en-



Lever Fulcrum Bracket Attached to Underframe Center Sill

tirely around the hopper openings and is riveted thereto. Below this upper frame is secured a lower frame which carries the guides for the slide and grooves for the unloading connection, the contacting surfaces of the two frames being finished to assure a perfect assembly. Between these frame members is a sliding gate, provided with a handhole for operating, and a pawl for locking and sealing the gate in closed position. The operating



Wine Type A Discharge Gate for Bulk Cement Cars—Near Gate Open and Others Closed with the Weather Shields Down

end of the assembled gate is covered by a weather tight shield which may also be sealed. The whole gate is of rigid construction to prevent the weave in the car body from influencing the alinement of the frames, or the sliding member, and to withstand the hard usage of this service. These discharge gates are furnished by the manufacturer as a completely assembled unit ready for application to the modified hopper sheets.

There are other possible uses for cars of this type, such as the handling of lime, glass sand, furnace lining, pulverized coal, or almost any bulk material which must be kept dry in transit, yet can be unloaded by gravity to an advantage. Some of these, as well as certain other materials, are already being handled in limited quantities in covered hopper bottom cars.

Rail Motor Car Cylinder Head

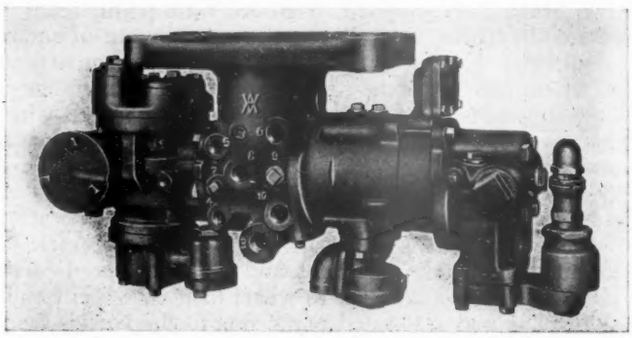
THE Locomotive Finished Material Company, Atchison, Kan., has developed a steel cylinder head for internal-combustion engines, used with power rail cars, which is said to possess important advantages over heads made of cast iron or other material. These heads formerly consisted of complicated castings in which it was difficult to maintain cores in the correct location. Hence, the wall thickness was apt to vary at vital points and restrict the circulation of cooling water. In addition, materials previously used did not stand the high temperatures; heads cracked and valve seats wore rapidly.

To meet this condition, the Locomotive Finished Material Company has developed a head made up of a combination steel casting with end plates welded in place. This reduces somewhat the complications of the head as formerly made in an integral casting. In the new design, the wall thickness can be checked and thinner walls used, resulting in greater water capacity. Moreover, defects can be readily remedied by welding and valve-seat wear built up by welding. Summarizing the advantages of this design, it produces a weldable head, stronger, more durable and having a greater water capacity than the cast-iron head. It is now being used on internal-combustion equipment by a number of midwestern roads.

Strainer Filling Piece for Universal Valves

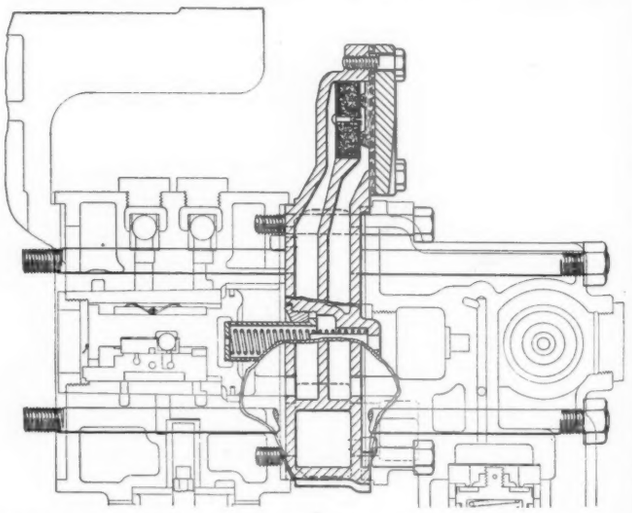
A STRAINER-FILLING piece to protect the quick-action portion of the universal valve from iron oxide and dust to the same satisfactory degree as previously provided for the equalizing portion of the present standard valve has now been provided by the air-brake manufacturers.

Interposed between the emergency portion and high-



Outside View of Universal Valve with Quick-Action Portion Strainer Filling Piece

pressure cap the filling piece conducts the brake-pipe passage through a flat cartridge-type curled-hair strainer, which removes the fine, floating, foreign particles from the air supplied to the quick-action portion. The strainer is located at the top of the filling piece where it remains dry and readily accessible for replacement. The accompanying illustrations show an exterior view of a universal valve with the strainer filling piece in heavy lines. It will be noted from this drawing that the emergency



Sectional View of Universal Valve with Strainer Filling Piece in Heavy Lines

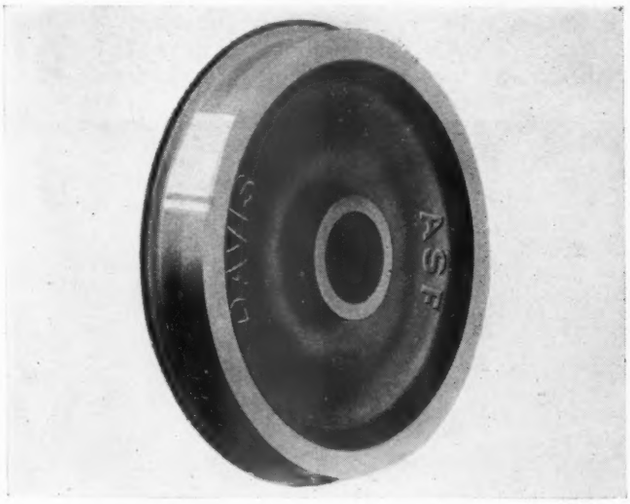
piston stop, spring and nut are now incorporated in the filling piece instead of the high-pressure cap formerly used. These parts are identical and interchangeable with previous standards.

Davis Heavy-Service Steel Wheel

AFTER an extensive period of research, test and development work, the American Steel Foundries began, early in 1933, to manufacture the Davis heavy-service steel wheel for use on passenger cars and tenders. This wheel is made from the same special composition alloy steel and given the same heat treatment as the Davis one-wear steel wheel which has been in extensive use for a number of years.

The special feature of this heavy-service wheel is that it is a multiple-wear wheel with a rim section designed in accordance with the American Railway Association recommended practice for multiple-wear steel wheels. The rim metal of the wheel has a hardness of approximately 400 Brinell, an ultimate strength in excess of 200,000 lb. per sq. in. and a high degree of toughness.

When Davis wheels were first introduced to the American railroads, it was exceedingly difficult to machine



Davis Multiple-Wear Steel Wheel Designed to Eliminate Tread Defects Caused by Heavy Service

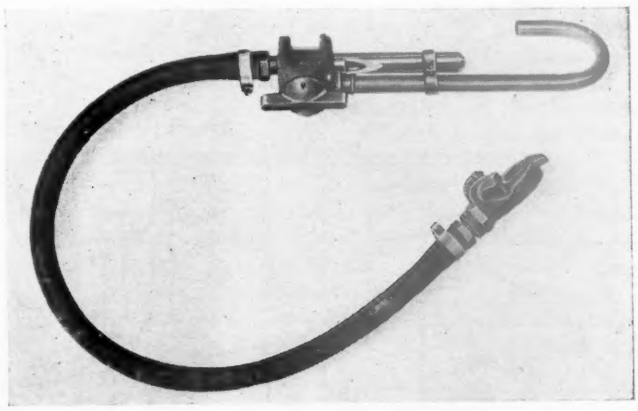
the treads on account of the tool and lathe equipment in general use. The developments of the machine tool industry have eliminated this difficulty and for a number of years some of the railroads have been reconditioning the treads of Davis one-wear wheels by turning where it has not been necessary to remove sufficient metal to reduce the rim section to the American Railway Association or Interstate Commerce Commission condemning limits.

As the Davis heavy-service steel wheel contains sufficient rim metal to permit of three wears, it is a decided improvement over the one-wear wheel for services which require multiple-wear wheels. It is claimed that, because of the special metal characteristics of the Davis wheel, its use in heavy tender service practically eliminates shell-outs and other tread break-down defects caused by heavy wheel loads, this valuable characteristic of the wheel apparently being substantiated by a number of service performance records.

Back-Up Valve and Whistle

THE Westinghouse Air Brake Company has developed a new back-up valve and whistle to give the rear-end pilot of a train complete control of back-up movements.

This device is easily handled on account of its light weight, and can be hung over the end gate by means of a hook formed on the brake pipe discharge tube. Its



Back-Up Valve and Whistle

construction is simple, the body containing only a curved rotary valve operating in a "slip" bushing, and manipulated by a cross-bar handle. The valve is extremely flexible, responding to the slightest handle movement for service or emergency applications under all atmospheric conditions.

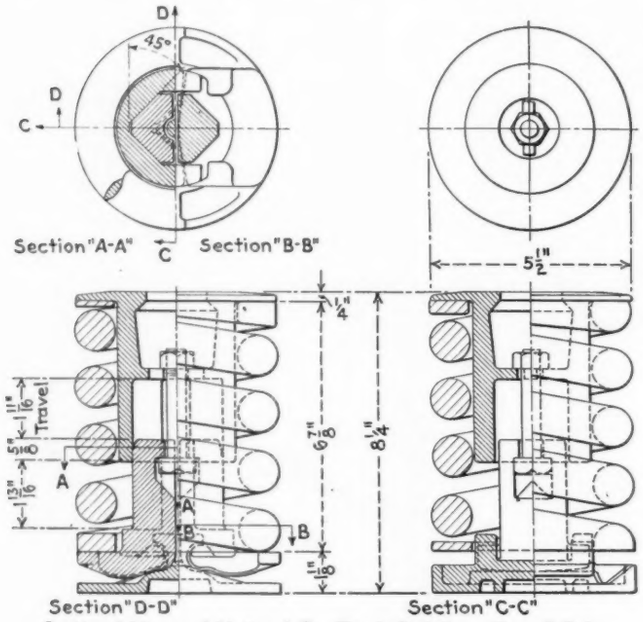
The whistle has a pleasing tone of ample carrying capacity. Its air consumption is small, and brake control is not affected by its use.

National F-2-A Car Truck Stabilizer

FOR several years the National Malleable & Steel Castings Company has been developing in the laboratory and in service a stabilizer or snubber for car truck springs. It has long been known that the conventional coil spring suspension used in freight car trucks was subject to violent vertical oscillations at certain speeds and that this was responsible for a great deal of damage to lading. The series of riding tests made in the fall of 1933 by the American Railway Association clearly demonstrated the nature of this spring action and showed that the use of properly designed friction stabilizers would prevent the building up of these harmonic oscillations. The National F-2-A stabilizer was included in these A. R. A. tests and was found to eliminate harmonic oscillation at all speeds covered by the tests. The use of such devices, together with the use of properly designed friction draft gears for protection against end shock should eliminate the greatest sources of damage to fragile lading.

The National F-2-A stabilizer consists of a friction case or housing, a base, two friction levers and a spring which presses the friction levers against the interior surfaces of the housing. One stabilizer is substituted for one coil spring under each bolster end. Any vertical movement of the bolster relative to the side frame causes

the levers to generate friction against the interior surfaces of the housing. The F-2-A stabilizer is so designed that proper frictional contact of its parts is maintained regardless of rocking or lateral movements of the bolster.



Sectional Views of National Car Truck Stabilizer, Type F-2-A

All parts of the stabilizer are made of the same heat treated alloy steels as are used in National friction draft gears, years of experience having shown that they possess the qualities necessary for maximum shock and wear resistance.

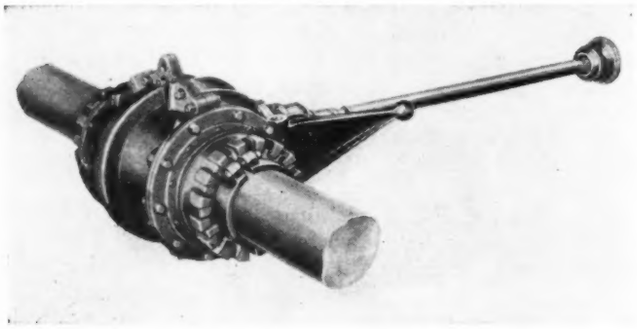
Car Generator and Compressor Drive

A POSITIVE mechanical drive for passenger-car electric-lighting generators and for refrigerating compressors used with air-conditioning installations has been developed by the Spicer Manufacturing Corporation, Toledo, Ohio. This drive is the outcome of tests and experience with a number of experimental positive drives for this purpose and is founded on a long experience in designing propeller shafts for automotive service.

The Spicer drive is extremely simple, consisting of a single pair of hardened alloy steel gears running in oil and completely protected from water, ballast and other abrasives. The gears are permanently adjusted at the factory, there being no mechanism requiring maintenance adjustment. Interchangeable gear ratios may be obtained without change in other parts. One standard size drive is sufficient for any A.R.A. axle, 5½-in. by 10-in., or smaller, and will handle generators up to 30 kw. capacity, or a compressor of corresponding load. It is compact, of light weight, contains no springs, and, being rubber mounted, is noiseless in operation.

All working parts being sealed, the drive should have a long life and require but little attention in service aside from a periodical checking of the lubricant when the electrical equipment is inspected.

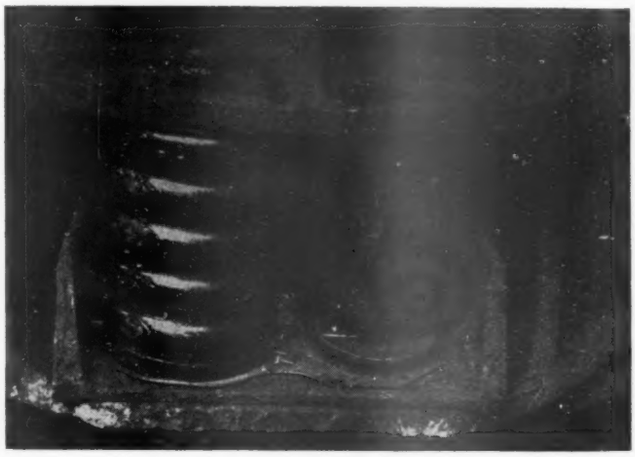
It may be applied directly to a rough-turned axle, no alteration or cutting of the truck frame or other parts being necessary. An installation may thus be made quickly and at a low cost. Power transmission losses should be low.



Spicer Positive Drive for Generators and Air-Conditioning Compressors

Holland-Volute Truck Springs

AMONG the interesting developments adopted to provide improved riding qualities in freight and passenger cars is the helical-volute truck spring combination, illustrated, which is furnished by Cyrus J. Holland, Peoples' Gas building, Chicago. As the name implies, these springs consist of a conventional helical spring and a volute spring, the latter being designed to develop friction under compression and, therefore, return less energy than is put into it. The characteristics of the volute spring, when combined with those of a helical spring working in parallel with it, produce a snubbing action which tends to dampen the vertical oscillation of trucks and car bodies at critical speeds, thus preventing damage to lading and equipment in the case of freight cars, and promoting easier riding when used in passenger equipment.



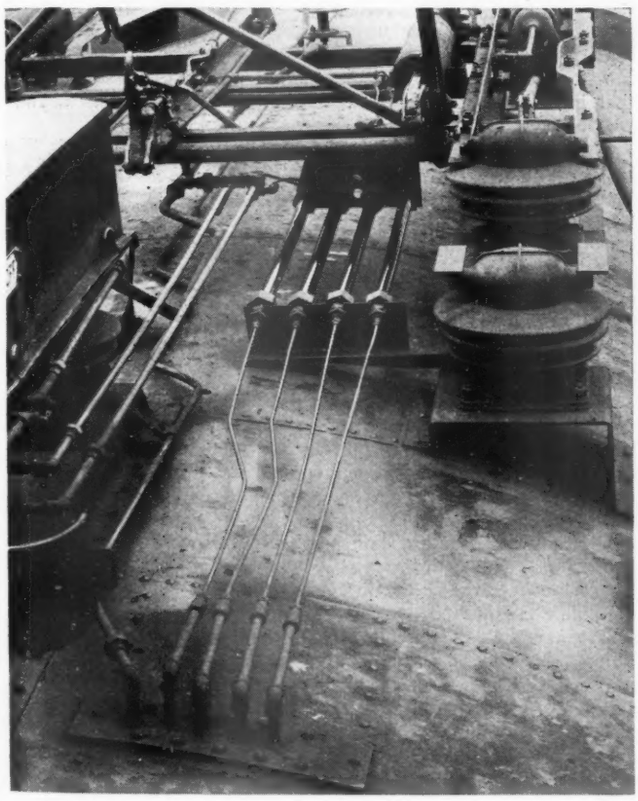
Holland Helical-Volute Spring Combination in a Freight-Car Truck

The Holland helical-volute spring arrangement is applicable to all car trucks without modifications or change in existing designs. These springs have been applied to various classes of equipment in steam road service during the past two years, including a railroad wrecker, gas-electric passenger motor cars and refrigerator cars. The Burlington high-speed, stream-lined train,

the "Zephyr," is equipped with helical-volute equalizer springs throughout, and this type of spring was also included in the tests of trucks and truck-spring devices conducted by the American Railway Association, Mechanical division, during the fall of 1933. Since the load deflection curve for this spring combination is not a straight line for the total travel, but shows relatively more deflection under light loads than under heavy loads, the helical-volute springs are said to promote easier riding in cars, regardless of whether they are empty or fully loaded.

Electrical Insulator for Air Lines

AN air-line insulator for making the necessary air connections for the operation of pantographs on electric locomotives and cars has been developed by the Westinghouse Electric & Manufacturing Company. The insulator consists of a porcelain tube



Westinghouse Air-Line Insulators on the Roof of a Multiple-Unit Car

equipped with fittings which permit it to be inserted in the air lines leading to the air cylinders used to raise or lower the pantograph. Such insulators are required, since the pantographs operate at full line voltage and the air lines are at ground potential.

All the connections between the air lines and the insulator are standard, a rubber bushing acting as a seal between the porcelain tube and the connector. The porcelain tube has a dry flash-over of about 125,000 volts and a wet flash-over of 85,000 volts. It is suitable for equipments operating on voltages up to and including 11,000 volts a.c. Two insulators are normally required for each pantograph, one for each air line. Where a bus-line coupler is used on the car four insulators are required.

Heating and Cooling Coils for Air Conditioning

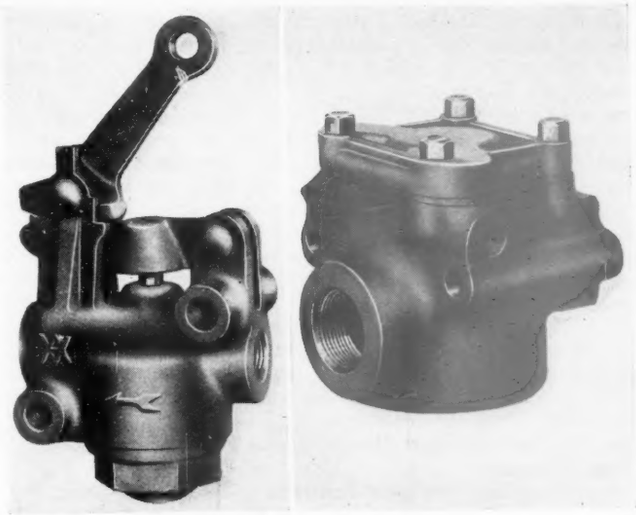
A COMPLETE line of heating and cooling coils for use in connection with passenger-car air-conditioning equipment has been developed by the Fedders Manufacturing Company, Buffalo, N. Y. These coils, which are available for use with all standard refrigerants, may be fitted with either flat or corrugated copper fins according to the type of installation best suited to the limiting conditions. Their construction is based on long experience in the manufacture of similar heat-transfer units for commercial refrigeration and air cooling as well as for the automotive industry. Incorporated in their design is the Fedders fused metal-to-metal bond between the copper fins and the copper tubes. This construction provides high operating efficiency and current economy in the condensing unit.

The Fedders Model 33 thermostatic expansion valve completes the low-side assembly and provides a refrigerant control device which is synchronized in design and control with the coils.

B-3-B Conductor's Valve and Brake Application Valve

AN improved means of making brake applications by operation of the conductor's valve has been developed by the Westinghouse Air Brake Company to overcome the limitations of previous designs on long cars that have a large brake pipe volume.

This new scheme involves the use of a large capacity Type E brake application valve, piloted by the B-3-B conductor's valve. The application valve is installed in a short branch pipe and connected by a small control pipe to the conductor's valve located at a convenient point. Operation of the conductor's valve quickly exhausts the small volume of air in the control pipe and the application valve immediately opens a high capacity vent from the brake pipe to the atmosphere.



B-3-B Conductor's Valve (Left)—Type E Brake Application Valve (Right)

Communications . . .

An Answer to the Question on the Iron and Steel Code

CHICAGO

TO THE EDITOR:

In the *Railway Age* of June 16, a railway officer asks why, under the provisions of the Iron and Steel Code, it is considered unfair practice to make or give "to any purchaser of any product any guaranty or protection in any form against a decline in the market price of such commodity."

Certainly it would be manifest that if a contract is to be mutually beneficial (which is the theory on which contracts are based), the price should be a definite one over a definite period. In other words, if the seller undertakes to protect the buyer against a rising market during the contractual period, he cannot fairly also give him the benefit of a lower market occurring during the same period. Such a contract would constitute a very one-sided arrangement, and presumably the provision quoted from the Steel Code was intended to prevent it.

A. C. MOORE.

In Defense of L. c. l. Rates

CHICAGO

TO THE EDITOR:

You published, in your issue of June 16, a letter from E. M. Moore, of Warrenville, Ill., in which he offered "sharp dissent" from your l.c.l. editorial of April 7.

By going over the entire field, and using more space than the *Railway Age* is willing to give to the subject, it would be possible to supply a logical answer to each of Mr. Moore's criticisms; but, considering limited space, there are just three points which I would call to his attention, and, as he is a self-confessed railroad protagonist and therefore willing to be convinced, I beg that he give them serious consideration.

First: Years ago, the public (which includes Mr. Moore) decided that free competition should be eliminated so far as the railroads are concerned. Since 1920, rates have been prescribed, not by the railroads, but by the Interstate Commerce Commission. Today, free competition, which permits the use of costs as a basis for rates, is (among freight and passenger carriers) enjoyed only by buses, trucks and the *unregulated* forms of transportation.

Second: Minimum charges for shipments of l.c.l. freight are equivalent to the one-cent charge which the retailer makes for a stick of chewing gum. No one supposes that the cost of manufacture is one cent or even a major fraction of that amount; but, considering the disproportionate overhead which is invariably built up in the handling of small articles, the charge is generally accepted as the only one within reason. In fact, there is really more to justify the railroad minimum than that of the gum vendor; for, if Mr. Moore wishes to delve into the intricacies of cost accounting, he will find that the present freight minima of 50-cents and 100 lb. provide considerably less profit than would satisfy him in his own business. It is preposterous to assume that a railroad, by imposing or increasing a minimum charge, would attempt to drive *profitable* business away from the doors of its freight houses. But, when the business becomes unprofitable, that is exactly what happens, and, though it may not have occurred to Mr. Moore, that is the sole purpose for which minimum charges were first conceived. If the weight of a shipment is less than 100 lb., or the weight extended at the rate amounts to less than 50 cents, the railroad would much prefer that the shipper take it to an express agency, where it can be handled more economically; or even to the post office, where the government will kid the gullible shipper by making an initial charge of less than cost and then pile the balance on his shoulders in the form of taxes.

Third and last, but most important of all: Mr. Moore, like most railroad critics, has seized upon that old slogan, "What the traffic will bear," and perverted it to mean, "What we think we can get away with." It has no such meaning, and never has, although its continued misinterpretation has brought it into disfavor as a basis for rate making.

In this connection, it is interesting to note the history of the slogan and to trace the steps by which it has become synonymous with "corporate greed" and "railroad viciousness." The popular version is that it originated in a famous rate case. The statistical officer of a large trunk line had been grilled by a government examiner for several days. In concluding the inquisition, the examiner propounded this question: "Mr. Hoozis, can you tell me, succinctly and substantially, just how it is that railroad rates are determined?"

Mr. Hoozis reflected a moment, and then, exasperated by his long grilling, blurted out: "We charge what the traffic will bear."

"Just what I thought," said the examiner, and, very well satisfied with the results of the examination, released the witness. The railroad lawyers were aghast, and tried by every means to have the testimony stricken from the record, but to no avail.

What Mr. Hoozis really meant was that, regardless of cost, the public's ability and willingness to pay must be the first consideration in the determination of a freight rate (or any other rate). His phrase was unfortunately worded; he should have said "no more than" instead of "what" the traffic will bear. But it was too late to repair the damage, and, through the long years that have intervened, Mr. Hoozis' phrase has served as a two-edged sword in the hands of the railroad antagonist.

Keep up the good work and let us have more editorials like that to which Mr. Moore offers such "sharp dissent." You have the railroad baiters on the run, Mr. Moore to the contrary notwithstanding.

GEO. MITCHELL.

Railroad "Fans"

MADISON, N. J.

TO THE EDITOR:

In your issue of June 9, you published an editorial entitled "Are Rail 'Fans' Disappearing?" Being a member of an organization of several hundred persons interested in railroading, particularly the historical side in comparison with the modern, I would say that "fans" are not disappearing, although the railroads, except in isolated instances, make little attempt to interest the public in what they are doing and why. We have given small exhibitions, with little interest shown by the railroads, whereas the public has turned out in considerable numbers. Every time the public has been encouraged to inspect a railroad property or some equipment, the number of interested persons has been astonishing. It is to be regretted that in this country there is little tradition and not a great deal of pride in our famous trains. I have ridden on one of our best known trains when the locomotives which hauled it were so dirty you could hardly read the numbers on their cabs. The "Royal Scot" or any other British train of importance would never have had so dirty a set of locomotives.

I would advocate "open house" at railroad terminals, at certain hours of say one day per week and invite the public to inspect the facilities and learn how a railroad operates. Anything which can be done, especially at little or no cost, to build goodwill and understanding, will have a favorable reaction on the public, and in turn help business on the railroad. Keep the public informed of what is going on. Try to induce the patrons of the roads to purchase its securities, for making a man a partner in an enterprise is a sure way of making him a booster. Interest is not dead and never will be so long as there are tracks, trains and men running them. Most men carry to their graves some of the small boy's enthusiasm for the locomotive and railroad. Everything consistent should be done to fan the spark of latent interest which almost everyone has in order that it maybe directed toward helping the railroads. Now is the time for the railroads to seek and encourage all of the help, aid and assistance they can get from the American public.

T. T. TABER,
Chairman, Railway & Locomotive Historical Society

Odds and Ends Department appears on next left-hand page

WHY

Any 10-Year Old Locomotive is inadequate

WHAT HAS HAPPENED TO HORSEPOWER

1914



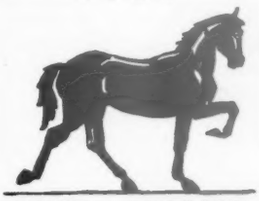
475 H. P.
per driving axle

1924



575 H. P.
per driving axle

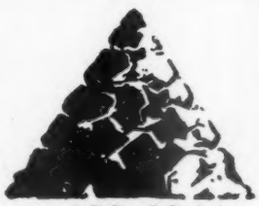
1934



OVER 1,000 H.P.
per driving axle

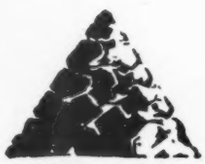
WHAT HAS HAPPENED TO FUEL CONSUMPTION

1914



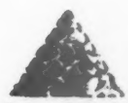
6½ LBS. COAL
per drawbar horsepower

1924



5 LBS. COAL
per drawbar horsepower

1934



3 LBS. OR LESS
per drawbar horsepower

So rapid has been the advance of locomotive design that not a single locomotive in this country over ten years old can begin to hold its own with the really up-to-date power plant on wheels known as the Super-Power locomotive.

LIMA LOCOMOTIVE WORKS
INCORPORATED

LIMA OHIO

Odds and Ends . . .

No More Wooden Coaches

Wooden passenger equipment is no longer to be seen on the Norfolk & Western. The last wooden car owned by the railroad, stripped of fittings and trucks, was recently lifted by two cranes, lowered on to a huge pile of scrap material and set on fire. Within recent months, 175 wooden N. & W. cars have been destroyed at the railway's Roanoke, Va., shops.

To Pep Up Jaded Palates

Miss Pearl Andrews has joined the dining car staff of the New Haven to keep a housewifely eye on stewards, chefs, kitchen men and waiters, serving as cookery consultant and final court of appeal on table setting and service. It will be her duty to to lighten the menu and pep up the palates of the diners.

Drives Train Coast to Coast

Although the Panama Railroad is full of enginemen who have driven trains from the Atlantic coast to the Pacific, Harry D. Robinson of Kearney, Neb., is one of the few who have done it in the United States. He drove the new Union Pacific streamline train during all of its recent tour, which not only comprised coast to coast but many thousand additional miles as well.

The Biggest One Got Away

The number of fishermen-liars in the country exceeds the popular conception, according to the Missouri Pacific Lines researches. This conclusion is drawn from the number of inquiries received by the railroad relative to service to the Lower Rio Grande valley, which will stage a deep-sea fishing rodeo at Port Isabel on the Gulf Coast east of Brownsville, August 8 to 12. "The medal to be awarded to the fisherman telling the biggest lie seems to attract more interest than the trophies and prizes to be awarded for fishing skill," commented one of the railroad representatives. Indications are that the fishing contests will attract anglers from all sections of the country, according to Dr. J. A. Hockaday of Port Isabel, chairman of the committee in charge of the affair.

A Busy Switchboard

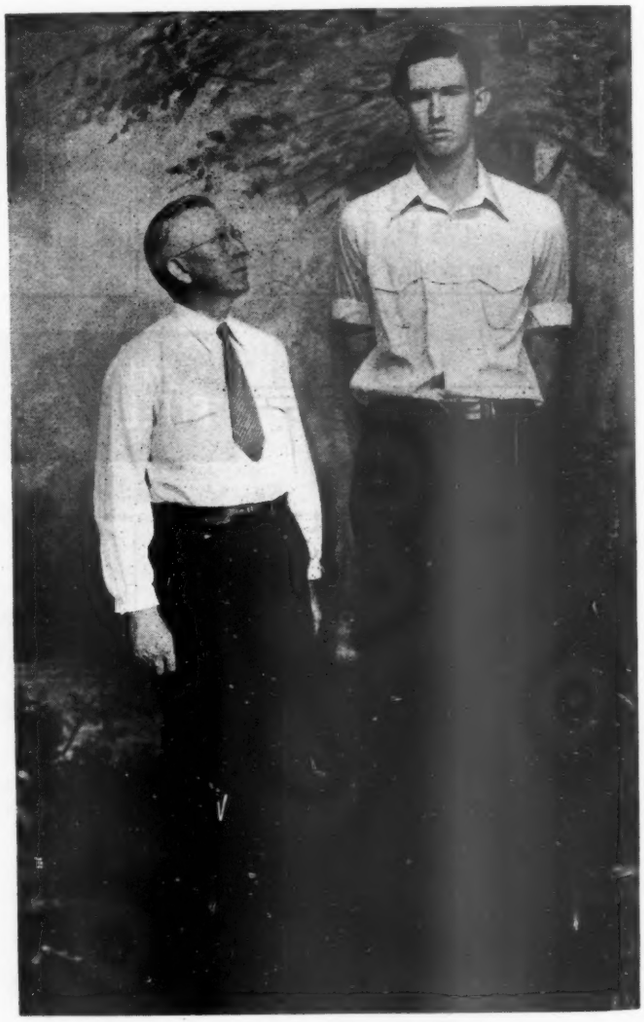
It is thought by officials of the Chicago, Burlington & Quincy that the number of calls regarding the run of the Zephyr from Denver to Chicago, May 26, probably created a record. The superintendent of telephone and telegraph service reports that the operators at the switchboard in the general office of the Burlington handled 9,000 calls about the Zephyr on the day of its run, while 2,000 additional calls were handled by the switchboard at the Chicago Union Station. The Burlington had also arranged with the Western Union for the stringing of wires and installation of a telegraph set in the Administration building on the grounds of A Century of Progress Exposition. Information relating to the run of the Zephyr was also available there and they handled approximately a thousand telephone calls, thus making a conservative estimated total of 12,000 telephone calls regarding the run of the Zephyr in one day.

"Munchausen" Solves Switching Problem

A highly original solution to the second of our recent switching puzzles—the one about two freight trains meeting at a turntable—deserves special attention. It is from "Munchausen" of Moncton, N. B. "The Baron" writes as follows: "This might very well puzzle anybody with less ingenuity than myself. As a matter of fact, when this occurred, I was somewhat puzzled as to why a turntable should be placed in the main line, but it was not very many moments before I realized how the turntable met the situation. The thing was simplicity itself. What I did was to place one of the locomotives on the turntable and pile the rest of its train on top of it. I then shoved the turntable to one side, took a few rails from the track to bridge the gap, and let the other train proceed on its way. After this had been done, I immediately reversed the procedure and the train that was on the turntable was ready to go. P. S.—Charlie was not there."

Southern Pacific Produces Winning Giant

Hardly was the news broadcast that the Chesapeake & Ohio had produced a 6 ft. 10½ in. contestant to defeat the Norfolk & Western's 6 ft. 8¼ in. entry when the Southern Pacific accepted the challenge and raised the ante ½ in. The newest entrant, whose picture appears herewith, is Charles Garvey, blacksmith apprentice in the Southern Pacific's shops in Sacramento, Cal., who makes a flight into the stratosphere of 6 ft. 11 in. from top to toe. The young Southern Pacific giant is 23 years old and weighs 220 lb. In addition to managing the shop baseball team, he plays first base and his team mates in the infield have only to heave the ball in the vague general direction of Garvey

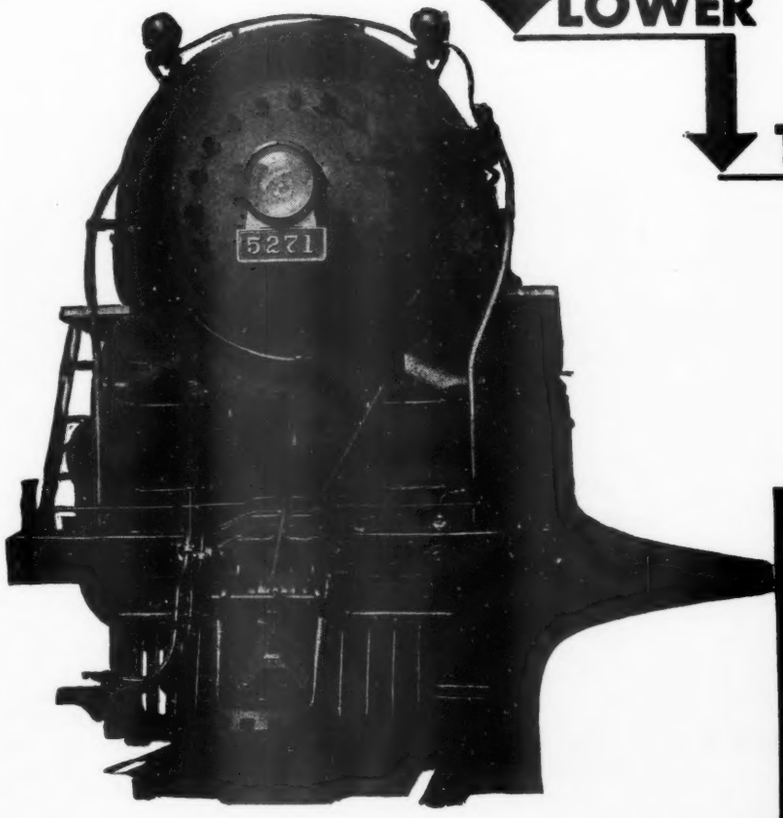


Here's Charles Garvey, All 6 Ft. 11 In. of Him, with H. C. Venter, 5 Ft. 9 In. Shop Superintendent, S. P., Sacramento

to be sure that he will fasten on to it with his capacious mitts. Because of the distance from Sacramento, Cal., to Russell, Ky., it has not been possible to get the Southern Pacific and the Chesapeake & Ohio entrants together for careful comparison, but the Southern Pacific advises that Garvey's measurements were taken by the chief draftsman and were stocking feet measurements, while every care was taken during the performance to secure an absolutely accurate figure. It appears, therefore, that Garvey holds the championship until someone finds a 7 ft. railroader somewhere.

News Department begins on next left-hand page

BOOSTERS WILL LOWER THE COST OF PRODUCING *ton-miles*



"Ton-Miles" is the product of the transportation plant.

Like any other manufacturer the railroad is concerned with producing them at the lowest cost.

Obsolete machinery must give way to modern, more efficient equipment.

No manufacturer who ordered duplicates of former designs when more efficient ones are available could long survive.

Give your new power full advantage of all the engineering developments in efficiency and economy that have taken place since you last bought locomotives.

Be sure they represent the high point in locomotive design and incorporate heat conservation devices and those elements such as The Locomotive Booster that help today's locomotives put to shame a locomotive that is only five years old.

The close tolerances essential to efficient Booster operation call for genuine repair parts made by Franklin.

FRANKLIN RAILWAY SUPPLY COMPANY, INC.

NEW YORK CHICAGO MONTREAL

NEWS

Bell Appointed Executive and Traffic Assistant to Co-ordinator

Co-ordinator Eastman has announced the appointment of Charles E. Bell, of Washington, D. C., as executive and traffic assistant. The announcement explained that one of the purposes of the emergency transportation act, is to "control allowances, accessorial services and the charge therefor, and other practices affecting service or operation, to the end that undue impairment of net earnings may be prevented." Through his three regional traffic assistants and with the aid of the commission's Bureau of Service, the co-ordinator has set in motion various inquiries looking to the accomplishment of this purpose and much progress has been made in that direction, particularly with reference to charges and practices at the ports. It has become evident, however, that to aid the co-ordinator in the centralized direction of this work and its vigorous prosecution, he has need for an executive assistant who can concentrate upon it and work with the three regional traffic assistants and the Bureau of Service. The three regional traffic assistants will continue to report directly to the co-ordinator as at present.

Mr. Bell was born in Cartersville, Ga. He entered the service of the Southern Railway in 1895 as stenographer to the general superintendent at Atlanta. In 1889 he became traveling freight agent of the Missouri Pacific at Atlanta, and shortly thereafter he was appointed commerce agent for the South of the Chicago, Indianapolis & Louisville. In 1900 he re-entered the service of the Southern as chief clerk in the division freight office at Savannah, Ga. In 1911 he was made assistant general freight agent at Atlanta, as a system rate-making officer, and when the Southern established a separate commerce department in Washington in 1916, he was placed in charge of it with the title of general freight agent.

In the last part of 1917 Mr. Bell was "loaned" by the Southern to the United States Food Administration in Washington, to serve as assistant transportation director, and upon advent of federal control of the railroads he was made assistant manager of inland traffic for the United States Railroad Administration. Later he was appointed special assistant to Edward Chambers, director division of traffic of that organization, and continued in that position until the end of federal control. For three months thereafter he continued as chairman of the Perishable Freight Committee of the American Railway Association. On June 1, 1920, he resigned from this position and from his connection with the Southern to engage in consulting capacity and the presentation of cases before the Interstate Commerce Commission and the state commissions. He has recently returned from Turkey after 10 months' service as railway adviser to the Turkish government, and upon completion of a report pertaining to the organization, administration, operation and traffic of its railway system, and to motor transportation in Turkey and its co-ordination with rail transportation.

5,000 U. P. Clerks Join Union

The Brotherhood of Railway Clerks has reached an agreement with the Union Pacific and its three subsidiaries, whereby the brotherhood will represent approximately 5,000 clerks and other office employees who, for the last 10 years, have been represented by a union of their own.

Insurance for Mexican Railway Employees

The Union of Mexican Railway Employees has established an insurance plan which will be placed in effect the first of July and which provides $1,000 to $2,000 life insurance for all employee members of the union, the amount varying with the employee's salary.

D. L. & W. Clerks Vote Against Union Affiliation

Clerical and certain station employees of the Delaware, Lackawanna & Western, in a recent ballot, opposed by a vote of 888 to 637 affiliation with a national union. The vote was taken on question of affiliating with the Brotherhood of Railway and Steamship Clerks, Freight Handlers, Express and Station Employees.

President Signs Railway Labor Act

The bill passed by Congress on June 18 to amend the railway labor act was signed by the President at New London, Conn., on June 21 and he was expected to announce the appointment of the three members of the new National Mediation Board which is to supersede the old United States Board of Mediation before leaving Washington at the end of the week for his trip to Hawaii. The old board had two vacancies, the three remaining members being Samuel E. Winslow, E. P. Morrow, and John Williams. Under the law the new board is to include not more than two of the same political party. The new National Railroad Adjustment Board is to be selected by the carriers, which will nominate 18 members, and by the national railroad labor organizations, which are to nominate 18 members. This board is to have headquarters in Chicago and meet within 40 days.

P.W.A. Loans Increase Track Employment

Over 30 per cent of the men on the track forces of 11 railroads which received P.W.A. loans for making roadway improvements were being paid with P.W.A. money on May 15, it was reported to Administrator Harold L. Ickes by Frank C. Wright, director of the division of transportation loans. The total number of track men employed on P.W.A. loan improvements on the 11 roads was 20,325.

Except for the P.W.A. program the track forces of the 11 roads possibly would have been cut instead of increasing in the year ending on May 15, Administrator Ickes also was advised by Mr. Wright. The number of men employed on the track forces of the 11 roads increased 13,936 between May 15, 1933, and May 15 of this year, or 6,389 less than the number of men now receiving employment on the P.W.A. projects. On May 15, 1933, the track forces of the 11 roads were employing 53,399 men, according to statistics compiled by the Interstate Commerce Commission, and on May 15 of this year the track forces of the same roads number 67,335 men.

From May 1 to 15, 1934, the men working on the P.W.A. projects were paid $426,916 in wages for 909,408 hours of work, an average of 46.3 cents per hour.

The total of the P.W.A. loans to the 11 roads for roadway improvements is $66,185,957, and other loans were made to them for purchasing new equipment and repairing old equipment in their shops.

The Pennsylvania had the largest number of men at work on May 15, with 7,123 employed on completing electrification of its line between Washington and New York for which P.W.A. made a loan of $45,000,000. The Southern Pacific was second, with 5,467 track men being paid out of a $12,000,000 P.W.A. loan of which $5,800,000 was for roadway improvements. The Great Northern was third with 4,266 men on its track forces being paid for work financed by P.W.A., and the Boston & Maine took fourth place with 1,355 men employed on track work for which P.W.A. had loaned $3,780,000.

New Equipment on Order

Class I railroads on June 1 had 20,011 new freight cars on order, according to reports compiled by the Car Service Division of the American Railway Association. On the same day last year, 1,205 new freight cars were on order and on the same date two years ago, there were 2,534. The railroads on June 1 this year also had 40 new steam locomotives on order and 107 electric locomotives. New steam locomotives on order on May 1,

Continued on next left-hand page

SAVING $1 HERE

COSTS $10 HERE



There's More to SECURITY ARCHES Than Just Brick

. . . ONLY A COMPLETE ARCH GIVES FULL ECONOMY

IN 12 years American railroads lowered the fuel consumption of freight locomotives 30%. Contributing to this achievement has been the extensive use of fuel-saving equipment such as the Security Arch.

If progress is to continue, full use must be made of every element that will save fuel.

Every Arch in every locomotive must have every course in place.

The importance of maintaining Security Arches is apparent when it is realized that for each dollar "saved" in Arch Brick cost, ten dollars of fuel is wasted.

Use a complete Security Arch for full economy.

HARBISON-WALKER REFRACTORIES CO.

Refractory Specialists

NRA MEMBER U.S. WE DO OUR PART

AMERICAN ARCH CO.

INCORPORATED

Locomotive Combustion Specialists » » »

1933, totaled one and on the same date in 1932, there were 18 on order.

In the first five months of 1934, the railroads installed 2,327 new freight cars. In the same period last year, 1,249 new cars were placed in service and for the same period two years ago, the total number installed was 1,671. One new steam locomotive and six new electric locomotives were installed in service in the first five months this year. The railroads in the first five months of 1933 installed one new steam locomotive and 22 in the corresponding period in 1932. Freight cars or locomotives leased or otherwise acquired are not included in the above figures.

State Helps Pay for Crossing Signals

The Public Service Commission of Pennsylvania has ordered the installation of flashing-light signals at three crossings on the Erie; Geneva, Gravity and Maplewood; and the Commission has appropriated from state funds (approximately half the cost in each case) $1200 for Geneva; $550 for Gravity and $650 for Maplewood.

I. C. Mexican Tours

Because of the rapid increase in travel to Mexico, the Illinois Central has arranged a series of escorted tours, the first of which left Chicago on June 21. These tours feature a two-day visit in New Orleans, while Mexico City is the headquarters for a program of sight-seeing in various sections of that country. The tours offered vary in length from two to several weeks.

The Crescent Limited Is No More

The Crescent Limited, fast Pullman train over the Southern Railway and connections, between New York and New Orleans, a feature of this line for the last 40 years, now has coaches as well as sleeping cars, and the extra fare has been abolished. Moreover, the time-honored name is no longer used, and hereafter, Numbers 37 and 38 will be the official appellations. The club car has been taken off.

I.C.C. Approves Passenger Service Traffic Pool

Division 6 of the Interstate Commerce Commission has approved the terms and conditions of a contract between the Canadian Pacific, the Canadian National, and the Boston & Maine providing for a pooling of passenger service and a division of the earnings therefrom between Montreal, Portland, and Kennebunk, Maine, during the summer season.

Southern Coach Passengers May Buy Pullman Space for Portion of Trip

The Southern has recently inaugurated a plan whereby passengers riding on its coach tickets may occupy Pullman accommodations for a portion of their journeys. Under the plan the passengers may now pay the train conductor in cash the difference between the one-way coach fare and the price of the one-way tickets good in Pullman cars to cover that portion of the journey on which the Pullman accommodations are occupied. They are, of course, required also to pay the regular charges for the space occupied in the Pullman cars.

For the July 4 holiday, the Southern is offering "fares to suit everyone to all points in the South." In an attractive three-color circular it is now exploiting these holiday fares which ranges from 1½ cents per mile for coach tickets to three cents per mile for one-way tickets good in Pullman cars, with the surcharge eliminated. Prospective patrons are advised that "it's safer and quicker by rail" and are thus urged to "avoid congested highways over the Fourth."

Freight Operating Statistics of Large Steam Railways—A Correction

The table of freight operating statistics of large steam railways which appeared on pages 939 and 940 of the *Railway Age* of June 23 gave figures for the month of April, 1934, compared with April, 1933. Because of a typographical error in its heading the table was labeled erroneously as a comparison of March, 1934, with March, 1933, figures.

New Erie Train Between Chicago and New York

The Erie, on June 17, established a new train. The Lake Cities, as a companion train to The Erie Limited. The new train leaves New York at 6 p. m. and arrives in Chicago at 4:50 p. m., while returning, it leaves Chicago at 9 a. m. and arrives in New York at 8:50 a. m. The two trains will carry air-conditioned sleeping cars, lounge restaurant cars and individual seat coaches as regular equipment.

Administration Members for Four Code Authorities Named

National Recovery Administrator Hugh S. Johnson, it was announced today, has appointed administration members to four code authorities, Col. Frank H. Phipps for the steel tire manufacturing industry, the locomotive appliance industry and the railroad special track equipment manufacturing industry and Charles P. Wood, of Lockwood Green, Engineers, Inc., for the railway car building industry.

I. C. Establishes Double Daily Freight Service

By adding several new dispatch freight trains and revising the schedules of existing service, the Illinois Central has established "double daily" freight service, whereby shipments can be made regularly both morning and evening, to and from all its principal terminals. In nearly all cases the "double daily" service effects a saving of from 12 to 24 hr. in deliveries, since schedules have been shortened and closer connections arranged.

Loading and Unloading Charges at St. Louis Found Justified

Division 4 of the Interstate Commerce Commission has issued a report finding justified a charge proposed by the railroads for loading or unloading carload package freight at their freight houses or over platforms at Cupples Stations, Mart Station, or Central Terminal Station at St. Louis, Mo. In a former case the commission had held that the refusal of the railroads to provide free loading and unloading at Midwest Station in St. Louis was in preference of their competitors at the other stations.

Increased Passenger Traffic on N. Y. C.

A considerable increase in passenger business, experienced recently by the New York Central, is attributed by that road's general passenger traffic manager, L. W. Landman, to the World's Fair and vacation travel. This road on June 24 increased its passenger train service to accommodate summer travel to New York State mountain and lake resorts and to Montreal. Also, its westbound "Wolverine," operating between New York and Chicago via Detroit, has had its schedule shortened one-half hour making its New York-Chicago running time 19 hr., 45 min.

Moffat Tunnel Controversy to Be Arbitrated

The dispute between the Denver & Rio Grande Western and the Denver & Salt Lake, arising out of the use of the Moffat tunnel, will be settled by arbitration. The Denver & Salt Lake has asked to be reimbursed for $388,000 spent for repairing the Moffat tunnel and for other roadway improvements. The Denver & Rio Grande Western has agreed to assume part of this obligation but demurred on other parts. The amount agreed upon was paid and the balance, approximately $300,000, was placed in escrow and will be left to arbitration.

Penalty for Favoring Warehouse Company

In the United States Court at Philadelphia on June 22, the Terminal Warehouse Company was awarded $410,338 damages in a suit against the Pennsylvania Railroad and the Merchants' Warehouse Company, alleging unfair discrimination in violation of the anti-trust laws. The Terminal Warehouse Company sued for $4,500,000, alleging the loss of that amount through preferences given to the Merchants' Company by the railroad. The jury awarded $136,125, and Judge Oliver B. Dickinson added interest and trebled the amount as provided by the anti-trust laws.

Power-Brake Law in a Crossing Damage Case

The Supreme Court of the United States holds, in a case decided on June 4, that the law requiring a railroad company (sections 1 and 9 of the Federal Safety Appliance Act) to equip trains with power brakes may inure to the benefit of travelers on the highway, at crossings. It holds that since the statute necessarily contemplates that the brakes prescribed shall be maintained for use, the operation of a train equipped therewith but with the air disconnected between engine and cars is a violation of the sections.

The action was one brought in the Ohio state courts by the driver of an automobile, for injuries sustained when struck by a train at a crossing. The Supreme Court holds that the Federal Safety Ap-

pliance Act does not affect the doctrine of last clear chance, so that the question of whether the doctrine was available as a defense was to be determined by the State law. Judgment for the plaintiff below was affirmed.—Fairport, Painesville & Eastern v. Meredith.—Opinion by Mr. Justice Sutherland.

The Train Staff System Suspended

The Public Utilities Commission of Maine has granted the petition of the Canadian Pacific for leave to discontinue the use of electric train staffs between Brownville Junction and Barnard, 8½ miles, because of a serious diminution of traffic. Trains are to be run by time-table and train orders, thus saving the wages of three operators.

It appears that the train staff was introduced voluntarily by the company in 1922, but has never been used in the summer months, when traffic was always very light. Traffic during the winter months is now nearly 40 per cent less than it was in 1922 and following years.

May Locomotive Shipments

May shipments of railroad locomotives from the country's principal manufacturing plants, as reported to the Bureau of the Census, United States Department of Commerce, totaled 34 as compared with none in April, one in May, 1933, and 15 in May, 1932. Unfilled orders at the end of May totaled 136 locomotives, including 65 steam and 60 electric for domestic service and 11 steam for foreign service. These latter compare with unfilled orders for 70 locomotives—69 electric and one steam—at the end of May, 1933. Statistics given herein do not include data on locomotives produced by railroad companies in their own shops.

Pittsburgh Traffic and Transportation Association Elects Officers

Frank J. Ryan, district representative of the Detroit, Toledo & Ironton at Pittsburgh, Pa., was elected president of the Traffic and Transportation Association of Pittsburgh at the annual election held on June 1. Other officers are: vice-president, J. Paul Stoecher, traffic department, Pittsburgh Steel Company; recording secretary, Henry F. Zentgraf, Chicago, Rock Island & Pacific; financial secretary, John I. Gannon, Spang, Chalfant & Company, Inc.; treasurer, Irwin G. Hodil, St. Louis-Southwestern.

W. B. Shepherd of the Aluminum Company of America, the retiring president, was presented with a set of golf clubs in appreciation of his services to the Association during the past year.

Warns Boys of Danger in Stealing Train Rides

The Delaware, Lackawanna & Western has recently sent to school teachers in Scranton and the mining district of northeastern Pennsylvania a circular warning boys of the danger which lurks on railroad tracks and moving trains. The circular shows a picture of a boy who, when twelve years old, lost his leg as a result of an unsuccessful attempt to board a moving train. Statistics are included which reveal that during the past ten years 4,382 boys were killed and 7,773 were injured while trespassing on railroad tracks and trying to "hop" trains. Boys are urged to stop and think of the danger when asked to go on the railroad tracks and are advised that they have no chance against a heavy moving train.

Railway Development Meeting

The effect of National Recovery Administration codes of fair competition on industrial development was given consideration at the twenty-sixth annual meeting of the American Railway Development Association at Kansas City, Mo., on June 21-22. The three-day program included addresses and discussions on industrial, agriculture and general railroad problems and a tour of Kansas City industries.

Officers elected for the ensuing year were as follows: President, John R. Ablett, industrial agent of the Delaware & Hudson, Albany, N. Y.; first vice-president, H. J. Schwietert, general agricultural agent of the Illinois Central, Chicago; second vice-president, J. A. Senter, industrial agent of the Nashville, Chattanooga & St. Louis, Nashville, Tenn.; and secretary-treasurer, E H. Gurton, manager of land settlement and development of the Canadian National, St. Paul, Minn.

Exclusion Clause in Mexican Lines Labor Contracts

The President of the Republic of Mexico has decreed that an exclusion clause be included in labor contracts signed by the Union of Mexican Railway Employees and the railroads in Mexico. The clause authorizes the union and the railways to dispense with the services of employees not belonging to the contracting union. Thus, if a strike is declared, no employee can remain on his job and it is construed that it will be unlawful for strikebreakers to replace strikers.

The matter had been discussed for a long time in the different courts and labor centers. As an understanding could not be reached with the unions, it was agreed by all concerned to submit the subject to the President for final decision. The decree is considered one of the most important rulings in connection with the history of railway labor unions in Mexico.

Although the different unions were merged into one union, the latter controlled only about 45 per cent of the 63,040 men employed on the railroads in the Republic, the remainder being members of other organizations or of none at all. As the decree established that the union now enrolling the majority of the employees shall be the only one authorized to contract with the railways, the Union of Mexican Railway Employees will automatically absorb all of the railway workers into a single unit.

Look Both Ways and Live

The foregoing is the title of the safety circular issued by the A. R. A. committee for the month of July. It is embellished with a half-dozen pictures showing the most common ways in which employees, and also passengers, forget this injunction and suffer death or injury by crossing tracks without thinking. In the 10 years ending with 1933 a total of 21,202 persons were killed on class I railroads by being struck or run over at places other than highway crossings; and three-fourths of these persons were trespassers.

Warning paragraphs are printed for each of numerous classes. Station employees, for instance, are occasionally killed because, while walking in yards, they are likely to be engrossed in the subject which has been the cause of their errand, forgetting all about moving locomotives. Of the 10-year total persons, no less than 161 were intending passengers.

Selling the North Woods of Wisconsin

As a means of promoting travel to the North Woods of Wisconsin, the Chicago & North Western has erected a full-size, completely furnished resort cabin in the main waiting room of its Chicago passenger station. The 22-ft. cabin, containing a living room, kitchen and bedroom, is built of logs and has a stone fireplace. During the first three days it was on exhibit, June 18, 19 and 20, a total of 6,935 persons passed through it. While most inquiries resulting from the display have concerned the cost of a trip to the woods, not a few persons have expressed a desire to buy property in the territory represented.



An Attractive Representation that Has a Strong Sales Appeal

Continued on second left-hand page

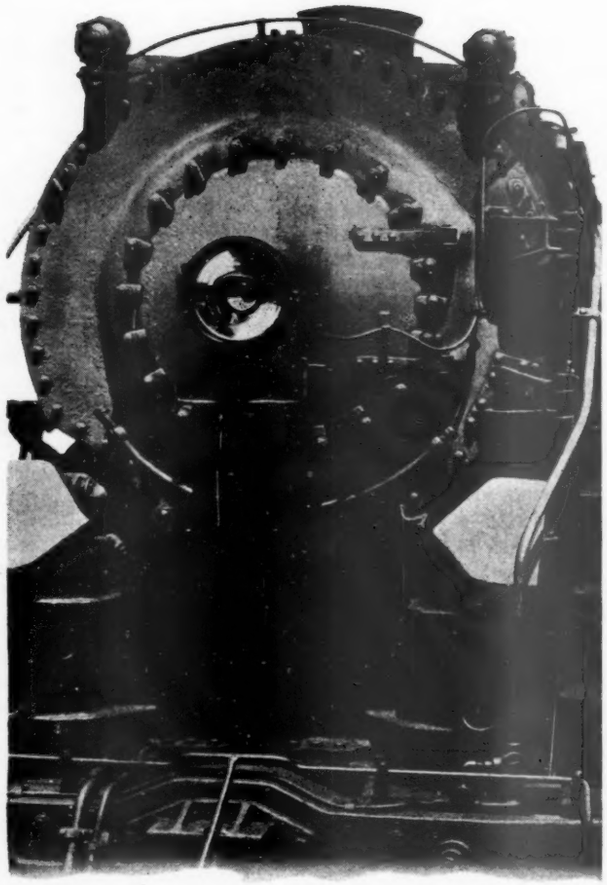
Compare!

	Locomotive No. 1	Locomotive No. 2
Indicated Horsepower	4200	3000
Hauling Capacity at 70 Miles per Hour	18 cars	10 cars

• • •

THE superior operation of locomotive No. 1 is due to an improved superheater providing increased capacity, an efficient feed water heating system, and a multiple-valve smokebox throttle, which improves efficiency by making superheated steam available for auxiliaries.

STEAM SUPERHEATING. For more than 20 years, the use of highly superheated steam in locomotives has been recognized as necessary to improvement in operation through increased power and marked savings in fuel and water consumption over saturated-steam operation. Hence, for many years, Elesco superheaters have been regularly applied to all new and most of the existing power. To increase further the benefits of superheated-steam operation, refinements in superheater design have been developed in recent years along standard Elesco lines, as represented by the Elesco type "E" superheater, which gives a much greater sustained horsepower than the Elesco type "A" superheater.



No. 1 *4-6-4 type passenger locomotive equipped with a type "E" superheater, an Elesco feed water heater, one live-steam injector, and a smokebox American multiple throttle.*

The latest design of superheater header incorporates a multiple-valve throttle. This throttle, the American multiple throttle, affords improved control of the locomotive by its location ahead of the superheater proper and through the use of a series of multiple valves, which provides close control of the flow of steam to cylinders. Since superheated steam is always available for auxiliaries, noticeable economy is effected.

These two locomotives consume the same quantity of fuel and water per mile



No. 2 *4-6-4 type passenger locomotive equipped with a dome throttle, a type "A" superheater, and two live-steam injectors.*

FEED WATER HEATING. The practice of reclaiming the potential power in exhaust steam is to be found in every up-to-date power plant. In locomotives, Elesco feed water heating equipment has found wide application because of practicability of design and high efficiency of performance.

The Elesco feed water heater reclaims the potential power in a part of the exhaust steam by transferring its heat to the feed water. Two styles are available: the closed or non-contact type and the open or exhaust-steam-injector type. Each type satisfies certain conditions or preferences. But the result is in either case the saving of a considerable portion of the heat, which otherwise would be lost through the stack, and returning this heat to the boiler in the feed water.

• • •

Greater capacity at higher sustained speeds are the obvious motive power requirements of today. Locomotives equipped with both Elesco superheating and feed water heating apparatus meet these requirements best.

THE SUPERHEATER COMPANY

Representative of AMERICAN THROTTLE COMPANY, Inc.

60 East 42nd Street
NEW YORK

ELESCO

Peoples Gas Building
CHICAGO

A-902

Canada: The Superheater Company, Limited, Montreal

Superheaters - Feed Water Heaters - Exhaust Steam Injectors - Superheated Steam Pyrometers - American Throttles

Long Island to Continue Reduced Fare Experiment

A further trial for a three-months period of the reduced round-trip fares and 10-trip bearer, 12-trip weekly and 20-trip monthly tickets which the Long Island, inaugurated on May 1, 1933, has been decided upon, according to an announcement by A. H. Shaw, general passenger agent of that road.

"Since May 1, 1933, when the company made available three new forms of commutation tickets for the benefit of part-time workers, and also placed on sale one-day and 30-day round trip tickets which save riders up to 40 per cent compared with regular two-way fares," said Mr. Shaw, "approximately 8,000,000 additional passengers have used Long Island trains."

"Notwithstanding this impressive total of people who took advantage of the reduced round trip fares and the new types of multiple-ride tickets," continued Mr. Shaw, "it is an unfortunate fact that the revenue did not increase sufficiently to offset the reduction in fares. In order, however, to determine definitely the proper plan to follow in the future, the railroad management feels that the present experiment should be carried on throughout the coming summer."

Ask Declaration Against Federal Rail Ownership

A declaration in favor of private ownership and operation of railroads would prove a stimulant to business generally and help restore the confidence of investors, according to a statement of principles adopted unanimously by the board of directors of the Illinois Manufacturers Association and sent to President Roosevelt, Illinois delegates in congress, Co-ordinator Eastman, the Interstate Commerce Commission and railroad presidents. Government ownership and operation was described by the association as "an uneconomic and unwarranted policy which would add billions of dollars to the present stupendous and fast-growing public debt and would not be in the interest of investors, shippers and the general public. The business of the railroads in general would be stimulated and permanently improved if the federal government would take a firm and definite stand in favor of private ownership and operation. This policy would go far toward restoring confidence to investors, would afford material aid to such railroad reorganization plans as may be necessary and would be an effective demonstration by our government that private initiative and enterprise are not to be supplanted in a country which has been built on such factors by dubious experiment involving state control."

Rail-Motor Co-operation

An inducement of mutual benefit to the railroads and the Ford Motor Company is being offered prospective automobile buyers to encourage them to visit the Century of Progress Exposition in Chicago. Under the plan the motor company makes it possible for the automobile buyer to purchase a car and at the same time visit the Fair with little additional cost. This can be done because Ford cars are considerably cheaper quoted f.o.b. Chicago than in most parts of the country. Orders are placed by the customer in the usual way with his local dealer, who receives full commission for the sale, but the new automobile is picked up in Chicago instead of being shipped to the customer in his home town. The names of the buyers under this plan are given, by the local Ford dealer, to the local passenger representatives, who, in turn, solicit him for the one-way movement to Chicago. Not only have the dealers been instructed to co-operate with the railways' soliciting forces, but a full-page advertising campaign, featuring the exposition and the Ford building there, together with the "pick up your car in Chicago" plan, was run in newspapers throughout the country on June 2 and 3 to stimulate this class of travel. The railways, on their part, are displaying at their stations some 5,000 posters distributed by the Ford people, showing the Ford building at the exposition and bearing the notice: "See Your Station Agent."

Train Speeds in Germany

Notable accelerations are again a feature of German summer train services, which became effective for the 1934 season on May 15, it is pointed out in an article appearing in a recent issue of the Railway Gazette (London). Attention last year was given to accelerations on Berlin-Hamburg runs and this year the Berlin and Hanover, Cologne, and Aachen services have been speeded up as well as those between Berlin, Nuremberg and Munich.

The fastest "FD" trains between Berlin and Cologne now make the 362.5-mile run in 6 hr. 25 min., eastbound, and 6 hr. 28 min. westbound, the fastest start-to-stop speed is 64.5 m.p.h. made on one section of the run. The time of the fastest "FD" trains between Berlin and Munich (418.8 mi.) has been cut by 53 min. southbound and 51 min. northbound. The run is now made by one train in 7 hr. 38 min. and another in 7 hr. 32 min. the latter representing an average speed of 55.5 m.p.h.

Many other accelerations, the Gazette says, have been made throughout Germany, as it continues to point out that improved facilities and electrification "play no small part in the improvement of services both inside Germany and connecting internationally with that country." Also, it continues, these accelerations "do not represent the last word" and in the latter connection it publishes a table of high-speed services which the German railways plan to introduce next year if they are satisfied with the operation of the "Flying Hamburger" which is now covering the 178.1 miles between Berlin and Hamburg in 138 min. or at a rate of 77.4 m.p.h.

The high-speed services planned for introduction next year would be operated with light-weight Diesel trains or rail motor cars. All but four of the 19 proposed runs listed in the table call for speeds of over 60 m.p.h. and nine call for speeds of 70 m.p.h. or over. For example, there is planned the 76.6 m.p.h. speed over the 210.7 mi. run between Berlin and Bremen; 75 m.p.h. for the 102.5 mi. between Berlin and Leipzig; 72.2 m.p.h. for the 372.8 mi. between Berlin and Konigsberg; and 69.8 m.p.h. for the 418.8 mi. between Berlin and Munich.

New York Central Dedicates West Side Project in N. Y.

Mayor La Guardia of New York was the principal speaker at the dedication on June 28 of the initial stage of the New York Central's West Side Improvement in New York City. The Mayor spoke at the ceremonies in the new St. John's Park Freight terminal, Spring street. With 1,500 shippers and business men of New York, he was a guest of the railroad on a special train operated from Grand Central terminal over the new freight line, which begins at Spuyten Duyvil and extends 13 mi. south to St. John's Park Freight terminal. The train was probably the only passenger train that will ever be operated over the new line, which is designed for freight only.

At the dedication ceremonies, F. E. Williamson, President of the New York Central Lnes, presided. In addition to the Mayor, the speakers were Leon G. Godley, New York transit commissioner and Samuel Levy, borough president of Manhattan. Outside the terminal there was on exhibition one of the West Side "cowboys" whose 85-year old jobs, involving horseback rides ahead of each train, are to be abolished with the completion of the new line. The ceremonies marked the opening of the new freight terminal, which covers more than three city blocks, as well as the opening, in terms of cost, of 85 per cent of the whole project.

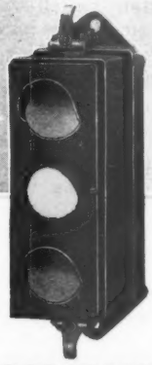
A detailed description of the completed track elevation work in connection with this project appeared in the *Railway Age* of June 23, while the new St. John's Park Freight terminal is described in this issue.

Traffic Club of New York Opens New Quarters

The Traffic Club of New York on June 26 opened its new quarters in the Biltmore Hotel in that city with dedicatory ceremonies commencing with a noon-day luncheon and extending through an open house in the afternoon to a dinner-dance in the evening. The new quarters are on the 18th and 19th floors of the Biltmore, occupying approximately one-half of each floor. On the 18th floor are the dining, lounge, meeting and recreation rooms, and the library, while on the 19th floor are special private, dining and conference rooms.

More than 1,000 members and guests of the club attended the dedication luncheon at which J. W. Roberts, perishable traffic manager of the Pennsylvania and president of the club, presided. Speakers included Morris S. Tremaine, comptroller of the State of New York, representing Governor Lehman; Bernard S. Deutsch, president of the Board of Alderman, of New York City, representing Mayor LaGuardia; F. E. Williamson and R. E. Dougherty, president and vice-president, respectively, of the New York Central; David B. Mulligan, president of the Bowman-Biltmore Hotels Corporation; J. L. Williams, chair-

Continued on next left-hand page



"Approach"

Indication -

10 GOOD REASONS—

—Why "Union" Coded Continuous Cab Signals are effective in improving railway service:

1. Increase safety of train operation.
2. Expedite traffic.
3. Signal indications are continuously visible irrespective of fog, other weather conditions, curves or physical obstructions.
4. Indicate *instantly* any changed condition on track ahead.

6. Determine location of broken rails.
7. Supplemented by audible indication.
8. Cab Signal duplicated on fireman's side.
9. Prevent misreading of wayside signals.
10. Effect operating economies.

—but shortly after passing this wayside signal the preceding train cleared the block in advance and the indication on the "Union" Coded Continuous Cab Signal immediately changed to "proceed", thus permitting the engineman to resume speed.

This signal system permits trains to increase speed *at any point* when a less restrictive indication is received, thus facilitating the maintenance of schedules. Frequently cab signals permit shortening of scheduled running time, thus increasing customer good-will.

Other good reasons for installing "Union" Coded Continuous Cab Signals will gladly be explained by our nearest district office.



1881 **Union Switch & Signal Co.** 1934

SWISSVALE, PA.

NEW YORK MONTREAL CHICAGO ST. LOUIS SAN FRANCISCO

man of the club's special committee on new club quarters; and Rev. W. Harold Weigle, rector of St. Paul's Church, Eastchester, Mount Vernon, N. Y., who also pronounced the invocation.

Mr. Roberts, in his brief talk, recounted some of the club's history, recalling that it established its first permanent quarters in the old Waldorf-Astoria Hotel in 1923 and remained there until the hotel was demolished. From 1928 until the present time its headquarters have been located in the Park Central Hotel. In connection with the acquisition of the new headquarters at the Biltmore, Mr. Williams stressed the co-operation of the New York Central and the Bowman-Biltmore Hotels Corporation as an important factor in making the move possible.

Mr. Williamson, after a whole-hearted endorsement of the club, the function of which he declared to be a "vitally helpful one," spoke briefly on the railroad situation in general. At no time, he said, have the railroads been more alert to their responsibilities. In this age of progress, experiment and realinement, he continued, railroad managers are prepared to keep abreast of the times. He thought that the depression has perhaps brought one benefit in that it enabled the railroads to slough off any fat which may have accumulated in the years of prosperity, and "now they are lean and hard" and face the future with confidence. As evidence of railroad enterprise Mr. Williamson mentioned the West Side project of the New York Central, which was dedicated on June 26, streamlined trains and air-conditioning. He predicted that the solution of the transportation problem will probably come through co-ordination of all types of carriers.

English Passenger Trains to Be Numbered

The Great Western Railway of England announces that, on Saturdays (nothing said about other days) the long distance express trains are to be numbered, in order to facilitate train movement at signal cabins and at stations. In ordinary practice, the only outward sign of classification on trains is the arrangement of lamps on the front of the locomotive to indicate whether the train is fast or slow.

The new arrangement consists of black and white figures 16 in. high. carried in a frame 3 ft. long on the front of the engine. The number will always consist of three figures, the first figure indicating the starting point. For example, all expresses from Paddington (London) bear numbers from 100 to 199. The Cornish Riviera Express will be No. 125. Returning from Plymouth this train will be No. 615. The 6 indicating Plymouth as the starting point. A second section westward would be 126; a third section, 127, and so on.

The occasion of this innovation is the congestion of passenger traffic on Saturdays, which is due to the unrestricted character of the summer tickets recently introduced. It is expected, according to the announcement, that the numbering of the trains will greatly assist in their operation.

Equipment and Supplies

P. W. A. Loans to Railroads

The New York, New Haven & Hartford has applied to the Interstate Commerce Commission for a modification of the commission's certificate of approval of expenditures to be made with the proceeds of a loan from the P. W. A., reducing the numbers of cars to be air-conditioned from 142 to 67 and increasing the expense from $303,763 to $443,700. The company said it had been found necessary to adopt a mechanical system of air-conditioning because of inadequate icing facilities at the Grand Central Terminal and that this would increase the cost but the reduction in the number of cars is partly due to the fact that the company has ordered 50 air-conditioned coaches. It is proposed to reduce the cost assigned to the rebuilding of 139 passenger cars from $640,742 to $500,805.

The P. W. A. has signed contracts with the Boston & Maine for a loan of $2,628,000 and with the Gulf, Mobile & Northern for a loan of $232,000.

LOCOMOTIVES

THE ALIQUIPPA & SOUTHERN has ordered one switching locomotive of the 0-8-0 type from the American Locomotive Company. This locomotive will have 25 in. by 28 in. cylinders and a total weight in working order of 231,000 lb. Inquiry for this equipment was reported in the *Railway Age* of June 2.

FREIGHT CARS

THE DETROIT, TOLEDO & IRONTON has ordered 15 steel covered hopper cars of 55 tons' capacity for carrying bulk cement, from the Greenville Steel Car Company. Inquiry for this equipment was reported in the *Railway Age* for June 2.

THE SEABOARD AIR LINE has placed an order for 1,000 double-sheathed all-steel box cars of 50-tons' capacity with the Pullman Car & Manufacturing Corporation. Three hundred of the cars will be built at its Richmond, Va., works and 700 at its Bessemer, Ala., plant. Inquiry for this equipment was reported in the *Railway Age* of March 31.

MOTOR VEHICLES

THE NEW ENGLAND TRANSPORTATION COMPANY, highway subsidiary of the New York, New Haven & Hartford, has ordered from the American Car & Foundry Motors Company five buses of 40-passenger capacity.

SIGNALING

THE PENNSYLVANIA-READING SEASHORE LINES has placed an order with the Union Switch & Signal Company for a 27-lever interlocking machine, 19 E.P. style "A-5" switch and lock movements with Style "C" cut-off switch valves, position light signals, etc., to be installed in an electro-pneumatic interlocking plant at Winslow Junction, N. J.

THE CHICAGO RAPID TRANSIT COMPANY has ordered from the Union Switch & Signal Company a 19-lever electro-pneumatic interlocking machine and an eight-way steel relay cabinet to replace equipment destroyed by fire at Tower No. 8, Wells and Van Buren streets, Chicago.

IRON AND STEEL

THE GRAND TRUNK WESTERN is inquiring for 170 tons of structural steel for a bridge at Lansing, Mich.

THE MISSOURI PACIFIC has ordered 170 tons of structural steel for a bridge at Dupo, Ill., from the Stupp Brothers Bridge & Iron Company.

Supply Trade

A. Giesl-Gieslingen, 4 West Thirty-first street, New York City, has resigned as United States representative of the **Lentz Locomotive Poppet Valve Gear** interests of Berlin and Vienna.

Stanley A. Knisley of the advertising department of the **Republic Steel Corporation,** with headquarters at Cleveland, Ohio, has been promoted to sales promotion and advertising manager, to succeed **L. S. Hamaker,** who has been elected vice-president of the **Berger Manufacturing Company,** a subsidiary. Mr. Knisley was formerly assistant secretary of the National Paving Brick Manufacturers' Association. From 1927 to 1933 he was director of advertising and research for the Sheet Steel Trade Extension committee which was changed in 1928 to the National Association of Flat Rolled Steel Manufacturers.

In commemoration of 104 years of progress and development, **Fairbanks, Morse & Co.** has devoted its entire 28-page summer issue of F-M News to the history and development of the company. "For Fairbanks, Morse & Co.," the issue begins, "the year 1934 marks more than a century of continual progress. The history of the organization dates back to the year 1830 when Thaddeus Fairbanks invented the first platform scale and with his brother, Erastus, manufactured them under the name of E. & T. Fairbanks." Many pictures of old and modern scales, internal-combustion engines, pumps, electric motors, rural and domestic products and inspection cars are shown.

The business of the **Railway Steel-Spring Company,** a wholly-owned subsidiary of the **American Locomotive Company** since 1926, has been consolidated with the parent company and the business heretofore conducted by the Railway Steel-Spring Company will hereafter be carried on by the American Locomotive Company, Railway Steel-Spring divi-

sion. In the consolidation the American Locomotive Company acquired the assets of the Railway Steel-Spring Company, including the manufacturing plants, sales orders and contracts, and the operating, sales and administrative personnel, and assumed all the liabilities, including contracts and orders for the purchase of materials and supplies. **Alexander S. Henry,** president of the Railway Steel-Spring Company, has been appointed vice-president of the American Locomotive Company, Railway Steel-Spring division.

Permanent Authority for Machinery & Allied Products Industry

National Recovery Administrator Hugh S. Johnson has approved the method of selection and recognized the personnel of the permanent basic code authority for the machinery and allied products industry.

The members are:—W. S. Shipley, president, York Ice Machinery Corporation, York, Pa.; W. C. Dickerman, president, American Locomotive Company, New York City; Leo W. Grothaus, assistant to the president, Allis-Chalmers Manufacturing Company, Milwaukee, Wis.; Paul C. De Wolf, vice-president, Browne & Sharpe Manufacturing Company, Providence, R. I.; P. C. Brooks, executive vice-president, Fairbanks, Morse & Co., Chicago, Ill.; George P. Torrence, president, Link-Belt Company, Chicago, Ill.; N. W. Pickering, president, Farrel-Birmingham Company, Ansonia, Conn.; Robert E. Friend, president, Nordberg Manufacturing Company, Milwaukee, Wis.; George H. Houston, president, Baldwin Locomotive Works, Philadelphia, Pa.; A. M. Mattison, president, Mattison Machine Works, Rockford, Ill.; Guy A. Wainwright, president Diamond Chain Manufacturing Company, Indianapolis, Ind., and Denis F. O'Brien, president, A. P. Smith Manufacturing Company, East Orange, N. J.

OBITUARY

Sydney R. Rectanus, vice-president of the American Rolling Mill Company, Middletown, Ohio, died suddenly in that city on June 22.

H. L. McCauley, district sales manager of the Inland Steel Company, with headquarters at Milwaukee, Wis., died suddenly in that city on June 26.

Robert D. Campbell, senior vice-president and a director of the Allegheny Steel Company, Pittsburgh, Pa., died from a heart attack on June 21 in a hospital at Orillia, Ont., at the age of 65. Mr. Campbell took a prominent part in Pittsburgh industrial circles for the past 25 years and was also a director of the Edward G. Budd Manufacturing Company.

Harry C. Butler, vice-president and director of the Montreal Locomotive Works, Limited, Montreal, Que., who died suddenly at his home in Westmont (Montreal) Que., on June 18, was born in southern Illinois in 1874. He was educated in a private school and at the University of Illinois from which he was graduated in engineering in 1899. On leaving college Mr. Butler took a position in the engineering department of the Vandalia, now a part of the Pennsylvania System. He then went to the Schenectady, N. Y., plant of the American Locomotive Company where he was in the engineering department from 1901 to 1906 when he went to the Montreal Locomotive Works, Limited as chief draftsman. During the war he was appointed night superintendent which position he held until 1918 and then was made works manager. In 1932 he was elected vice-president and director, which position he held at the time of his death.



Harry C. Butler

TRADE PUBLICATIONS

POWER FACTOR.—"Improving Power Factor for Profit" is the title of a 28-page illustrated booklet describing applications of General Electric Pyranol-treated capacitors. Apparatus for power factor improvement is cataloged and data are also included to show how power factor can be improved, with resulting economy, by the use of this apparatus.

LIGHTNING ARRESTERS.—A new series of booklets on Crystal Valve lightning arresters is now being published by Electric Service Supplies Company, Philadelphia, Pa. Nos. 1 and 2 of the series are now available. They describe respectively, progress made through the years in lightning protection and details concerning the installation and operation of Crystal Valve lightning arresters.

WOOD CONDUIT.—The Southern Wood Preserving Company has released, through its general office in Pittsburgh, a booklet entitled "The Trend Toward Wood Conduit." The booklet deals with the history of such conduit and emphasizes the development of a conduit capable of carrying 33,000-volt electric power lines. Drawings of model service duct arrangements and photographs of installations are included.

"UTILITY" AIR HOISTS.—The Ingersoll-Rand Company, New York, has issued a 32-page booklet dealing with its single- and double-drum Utility air hoists. The booklet fully describes the construction and operation of different hoists, presents capacity and speed tables, and fully points out and illustrates the many uses of the hoists in construction and maintenance operations and for towing and hauling work.

Construction

DELAWARE & HUDSON.—The New York Public Service Commission has approved specifications and an estimate of cost of $117,000 for the elimination of the Windsor crossing of this road in the town of Champlain, Clinton county, N. Y., one mile south of Rouses Point. The commission authorized the railroad to do the work of changing its tracks and signal system by direct employment and purchase of materials, limiting the amount for this work to $12,004.

ERIE-LEHIGH VALLEY.—The New York Public Service Commission has approved a general plan of construction and track detour and an estimate of cost of $96,100 in connection with the elimination of the William and South Ogden streets crossings of these roads in Buffalo, N. Y. The Lehigh Valley was also authorized to do certain work by direct employment of labor and purchase of material, without contract, limiting the amount to $32,814. This work consists of constructing and removing temporary detour tracks, changing its existing tracks, signal and telegraph system, constructing, maintaining and removing temporary highway detour, removing existing crossing facilities and closing the crossings. A plan for Queen street bridge in connection with the elimination of these crossings was also approved.

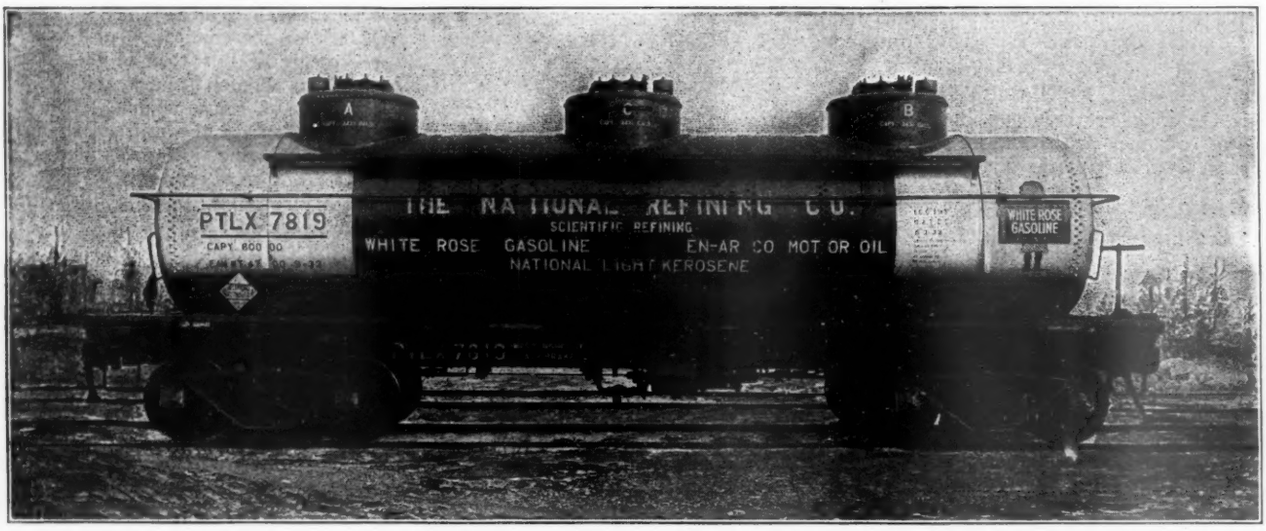
PENNSYLVANIA.—The New Jersey Board of Public Utility Commissioners has refused to grant this road an extension of time to begin work on the elimination of the garde crossings of Oak Tree road, Iselin, N. J., and Colonia boulevard, Colonia.

PENNSYLVANIA.—Contracts have been let by this company as follows: To Franklin M. Harris & Co., Philadelphia, Pa., for the erection of platform shelters and service building over mail platforms No. 7, 8 and 9, at the new Pennsylvania station, Philadelphia and to the W. G. Cornell Company, Philadelphia, for the heating, ventilating, plumbing, drainage, and track service piping for mail platforms and miscellaneous facilities under the east plaza of the station; to the John F. Casey Company, Pittsburgh, Pa., for relining tunnel No. 1 on the Marietta branch of its Cleveland division at Stone Creek, Ohio.

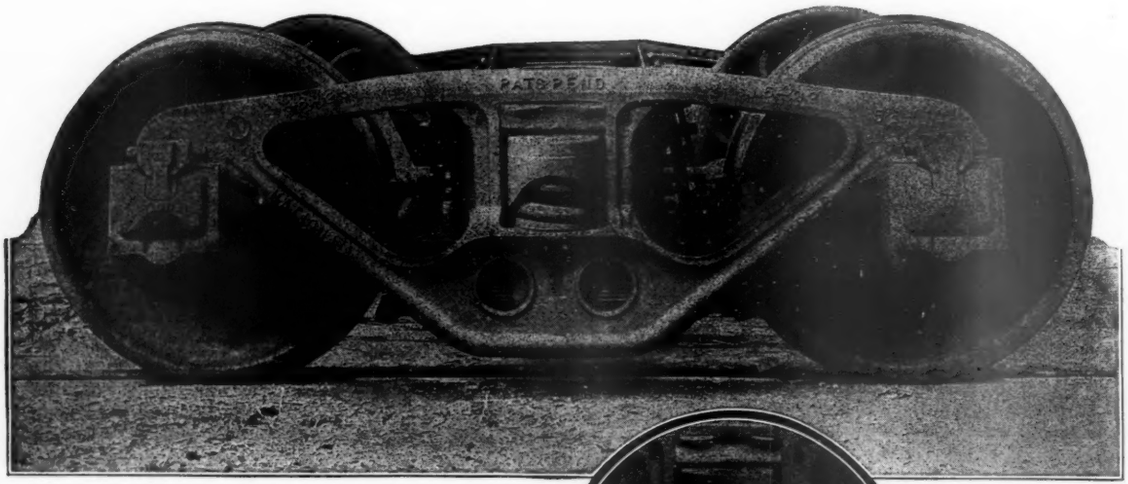
PENNSYLVANIA.—The New York Public Service Commission has approved specifications and an estimate of cost of $464,532, exclusive of land and property damages, for work in connection with the elimination of the South Main street, Miller street, South avenue and LaFrance street crossings of this road in the City of Elmira, Chemung county, N. Y. The commission authorized the railroad to do the necessary work of changing its tracks, signal, telephone and telegraph system and raising miscellaneous yard facilities in connection with the elimination of these crossings at actual cost by direct employment of labor and purchase of material, for an amount limited to $21,417.

Continued on second left-hand page

National Type "B" Truck



The elimination of the usual spring plank saves initial cost, also considerable time and expense when changing wheels





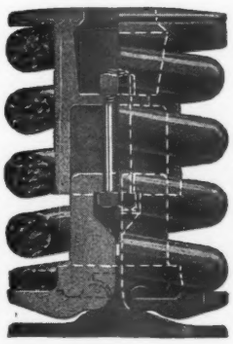
Full Coil and "Coileaf" Springs are interchangeable in National Type "B" Trucks

NATIONAL MALLEABLE AND STEEL CASTINGS CO.

General Office — Cleveland, O.

Sales Offices: New York, Philadelphia, Chicago, St. Louis, San Francisco
Works: Cleveland, Chicago, Indianapolis, Sharon, Pa., Melrose Park, Ill.

Car and Lading Protection



plus



NATIONAL F-2-A STABILIZER

NATIONAL M-17-A DRAFT GEAR

NATIONAL F-2-A Stabilizers for prevention of vertical oscillations of truck springs

NATIONAL M-17-A Draft Gears for protection against end shocks

NATIONAL Stabilizers + NATIONAL Friction Draft Gears = Complete

Car and Lading Protection

National M-17-A Draft Gears
are
A-R-A Certified

NATIONAL MALLEABLE AND STEEL CASTINGS CO.

General Office — Cleveland, O.

Sales Offices: New York, Philadelphia, Chicago, St. Louis, San Francisco
Works: Cleveland, Chicago, Indianapolis, Sharon, Pa., Melrose Park, Ill.

Financial

ATCHISON, TOPEKA & SANTA FE.—*Dividend on Common Stock.*—The Board of Directors of this road on June 26 declared a dividend of $2 a share on the common stock for the year commencing July 1, 1933, and payable on September 1 to stockholders of record July 31. This dividend, which is to be paid from surplus, is the first which the Santa Fe has disbursed on its common stock since June, 1932, when $1 was paid.

BALTIMORE & OHIO.—*August Maturities.*—Representatives of this road have been conferring informally in Washington regarding ways of meeting its August 10 maturities of $25,500,000 due to the Reconstruction Finance Corporation and $17,500,000 secured notes. Tentative arrangements had been made with private bankers for a $25,000,000 note issue to cover the latter, contingent on the renewal of the R. F. C. loan, but the R. F. C. has offered a new loan of $17,500,000 at a lower interest rate.

BOSTON & MAINE.—*Abandonment.*—This company has applied to the Interstate Commerce Commission for authority to abandon operation of a line from Keene, N. H., to Coolridge Crossing, 23 miles.

BOSTON & MAINE.—*Abandonment.*—The Interstate Commerce Commission has authorized this company to abandon a branch line extending from Belmont Junction, N. H., to Belmont, 4 miles.

BOSTON & MAINE.—*Abandonment.*—The Interstate Commerce Commission has authorized this company to abandon that part of its railroad extending from the southerly approach of the Dover Point Bridge, Newington, N. H., over the bridge to a point beyond its northerly approach in Dover, 1.8 miles.

CHICAGO & EASTERN ILLINOIS.—*Reorganization Plan.*—The protective committee for the general mortgage bonds of this road has filed with the Interstate Commerce Commission a plan of reorganization proposing a reduction in capitalization from $64,441,528 to $42,390,400.

CHICAGO, ROCK ISLAND & PACIFIC.—*Interest Action.*—A petition of trustees seeking the payment of January 1, 1934, semi-annual interest of $2,000,000 on general mortgage 4 per cent bonds was taken under advisement by Federal Judge James H. Wilkerson on June 22. Attorneys representing the protective committee of the Choctaw & Memphis and the Choctaw, Oklahoma & Gulf bondholders argued against the payment and attempted to show that the money could be better used in maintenance of the property.

DELAWARE, LACKAWANNA & WESTERN.—*Bonds.*—The Interstate Commerce Commission has authorized the New York, Lackawanna & Western to issue $13,639,000 of first and refunding mortgage, series A, bonds, reducing the interest rate from 5 to 4 per cent and the parent company (the D. L. & W.) has been authorized to assume liability as guarantor for the bonds and to sell them at not less than 91, which will make the average annual cost approximately 4.49 per cent. The proceeds are to be used in payment of short term notes. The railroad has made no contract for the sale of the bonds but has offered them to about thirty dealers at 91½ per cent.

IRON MOUNTAIN.—*Gold Clause.*—United States District Judge Charles B. Faris has upheld the constitutionality of the congressional resolution abrogating the so-called gold clause in various contracts in ruling that $34,548,000 of gold bonds originally issued by the Iron Mountain should be paid only at their face value in money of the United States now current. The bonds contained a promise that they would be paid off in gold coin of the United States of the weight and fineness at the time of their issue. Had this clause been sustained by the court, about $1,693 in currency would be needed to pay off each $1,000 bond and the $34,548,000 debt increased to approximately $58,500,000. This is the first time that a federal court has passed on the congressional resolution regarding the gold clause. Judge Faris held that since Public Resolution No. 10 passed by Congress in June, 1933, is valid, the gold clause in the Iron Mountain bonds is unenforcible in the ultimate letter thereof as urged by the interveners, the Bankers Trust Company of New York, trustee for the bonds, and, therefore, the bonds are to be paid off only in currency equal to the par value of each bond as is now current, or as shall be current when the final decree herein for payment is entered.

LOUISIANA & ARKANSAS.—*Promissory Notes.*—This road has been granted authority by the Interstate Commerce Commission to renew and extend from time to time, and continue to pledge collateral therefor, three promissory notes—one in the amount of $1,400,000 payable to the Chase National Bank of New York and two others aggregating $557,223.14 payable to the Railroad Credit Corporation. Authority was also granted to issue and renew from time to time promissory notes aggregating at any time outstanding not exceeding $192,776.86. The Commission deferred action on authorizing the issue of $350,000 more of these latter until necessity for their issue has been shown.

MINNEAPOLIS, ST. PAUL & SAULT STE. MARIE. — *Abandonment.* — The Interstate Commerce Commission has authorized this company and the Wisconsin Central and its receiver to abandon a line of the latter company extending from Abbotsford, Wisc., to Curtiss, 5.1 miles.

MISSOURI PACIFIC.—*Trusteeship.*—Trustees of the Missouri Pacific, on June 22, were ordered by Federal Judge Faris to keep records and accounts showing separately the tolls, earnings, incomes, rents, issues and profits which have come into their possession since January 1, 1934.

PENNSYLVANIA.—*Dividend on Common Stock.*—The board of directors of this company on June 27 declared a one per cent dividend, or 50 cents a share, payable on September 15 to stockholders of record of August 1. This is the second 50-cent dividend declared by the Pennsylvania this year, the first having been paid on March 15. Last year one 50-cent dividend was declared. In announcing the dividend the company said: "The earnings of the company for the first six months, partly estimated, will equal 1.57 per cent on the capital stock, and after customary sinking funds are deducted, will equal 1.18 per cent on the stock." The total disbursement was announced as $6,583,848, and the number of shareholders on May 31, as 234,246.

PENNSYLVANIA.—*Bonds.*—The Interstate Commerce Commission has authorized the Connecting Railway to issue and deliver to the Pennsylvania at par $1,217,000 of its first mortgage 4 per cent bonds in partial reimbursement of indebtedness. The latter company has been authorized to assume liability as guarantor of the bonds and to sell them to Edward B. Smith & Company of Philadelphia at 101.25, which is on a basis of approximately 3.9 per cent.

TABOR & NORTHERN.—*Abandonment.*—The Interstate Commerce Commission has authorized this company to abandon as to interstate and foreign commerce its entire railroad extending from Tabor, Ia., northerly to a connection with the Chicago, Burlington & Quincy at Malvern, 8.6 miles.

SOUTHERN PACIFIC. — *Abandonment.* — The Interstate Commerce Commission has denied authority to this company to abandon the operation of a part of its Promontory branch extending from Kelton to Lucin, 55 miles. The Federal government intervened in this case in opposition to the application of the railroad, contending that the branch would be needed in the event of a war with a Pacific power.

UNION PACIFIC.—*Abandonment.* — The Interstate Commerce Commission has authorized the Oregon-Washington to abandon a branch extending from Pine Creek, Idaho, on its Tekoa-Wallace branch, southerly to Heim, 2.4 miles.

Average Prices of Stocks and of Bonds

	June 26	Last week	Last year
Average price of 20 representative railway stocks.	43.20	43.78	43.15
Average price of 20 representative railway bonds.	78.18	78.86	70.31

Dividends Declared

Atchison, Topeka & Santa Fe.—Common, $2.00, annually, payable September 1 to holders of record July 31.

Michigan Central.—$25.00, semi-annually, payable July 31 to holders of record July 21.

Norfolk & Western.—Common, $2.00, quarterly, payable September 19 to holders of record August 31; Adjustment Preferred, $1.00, quarterly, payable August 18 to holders of record July 31.

North Carolina.—Guaranteed Stock, $3.50, semi-annually, payable August 1 to holders of record July 20.

Pennsylvania.—50c, payable September 15 to holders of record August 1.

Piedmont & Northern.—75c, quarterly, payable July 10 to holders of record June 30.

Schuylkill Valley Nav. & R. R.—$1.25, semi-annually, payable July 12 to holders of record June 30.

Shamokin Valley & Pottsville.—$1.50, semi-annually, payable August 1 to holders of record July 15.

Continued on next left-hand page

RAILWAY PIPING AT ITS BEST!



Pierced from SOLID STEEL- no welds!

CHECK THESE ADVANTAGES

- ✓ *Seamless—no welds.*
- ✓ *High tensile strength.*
- ✓ *Exceptional uniformity.*
- ✓ *Unusual bending and flanging qualities.*
- ✓ *Resistant to corrosive influences.*
- ✓ *Made from superior quality open-hearth steel.*
- ✓ *Complete range of sizes, wall-thicknesses, and lengths.*
- ✓ *Proved performance under exacting service.*

For steam, air, and water lines, especially in new locomotives and cars, NATIONAL Seamless Pipe represents the ultimate of security. It is the last word in railway piping. Why? Because there is no weld—no long line of possible weakness. No chance—no uncertainty about the uniform wall strength of this modern pipe. Pierced from a solid billet, expanded and rolled at definitely controlled temperatures to produce proper grain refinement, equal transverse and longitudinal strength, uniform ductility, this modern pipe is a balanced, homogeneous unit, unsurpassed from a manufacturing standpoint.

Under the highest pressures and temperatures of new locomotive power and for the hardest conditions that piping in cars must meet, NATIONAL Seamless Pipe will give the necessary security, and, by reducing future repairs and replacements, will cut maintenance costs to a minimum. Our field engineers and railway boiler tube and pipe experts will be glad to discuss your piping problems. For present safety and future economy, specify NATIONAL SEAMLESS—

America's Preferred Seamless Pipe

NATIONAL TUBE COMPANY • Pittsburgh, Pa.

Subsidiary of United States Steel Corporation

NATIONAL SEAMLESS

Railway Officers

EXECUTIVE

Sloan, M-K-T-Chairman, Becomes President Also

Matthew S. Sloan, who on April 11 was elected chairman of the board of the Missouri-Kansas-Texas at New York, has also been elected to the presidency of that road. A photograph and sketch of Mr. Sloan's career was published in the *Railway Age* of April 21, page 575. Mr. Sloan succeeds M. H. Cahill in both positions.

Following the resignation of **J. M. Baths** as vice-president in charge of operation of the Chicago Great Western to become western regional director on the staff of the federal co-ordinator of transportation, **H. W. Burtness,** assistant to president and secretary, has had his jurisdiction extended over the transportation department, while **S. M. Golden,** assistant to the president, has assumed jurisdiction over the mechanical, maintenance of way and stores departments in addition to his other duties.

George A. Kelly, general solicitor of the Pullman Company, has been elected vice-president in charge of public relations, with headquarters as before at Chicago, succeeding **James Keeley,** deceased. Mr. Kelly has been connected with the legal department of the Pullman Company since 1920. He was born on May 12, 1886, at Ottawa, Ill., and was educated in law at



George A. Kelly

the University of Michigan. He was admitted to the bar in 1908 and subsequently became connected with the law firm of Winston, Payne, Strawn & Shaw at Chicago. Mr. Kelly entered the service of the Pullman Company in 1920 as a solicitor, subsequently being advanced to general solicitor, which position he was holding at the time of his election as vice-president in charge of public relations.

OPERATING

A. Williamson, superintendent of the Elkins division of the Western Maryland, with headquarters at Cumberland, Md., has been appointed general superintendent, with headquarters at Baltimore, Md. **J. A. Abbott** has been appointed superintendent of the Elkins division to succeed Mr. Williamson.

C. W. Dowdy, trainmaster of the Norfolk division of the Virginian, with headquarters at Victoria, Va., has been transferred to the New River division, with headquarters at Princeton, W. Va., succeeding **B. L. Pedneau,** who has been appointed chief dispatcher at that place. **G. B. Daniel,** who was chief dispatcher at Princeton, has been appointed trainmaster of the Norfolk division, with headquarters at Victoria, Va., to replace Mr. Dowdy.

Harold D. Barber, who has been appointed assistant general manager of the Western district of the Erie, as noted in the *Railway Age* of June 9, was born on December 31, 1891, at Norwalk, Ohio. He first entered railway service on June 15, 1909, with the Wheeling & Lake Erie, leaving this company in October, 1914, to go with the Erie as a stenographer in the superintendent's office at Meadville, Pa. During the following eight years Mr. Barber served successively as a stenographer in the general manager's office at Cleveland, secretary to the assistant general manager, secretary to the general manager, assistant chief clerk to the general manager, special agent in the general manager's office at Youngstown, Ohio, chief clerk in the office of the car service agent, assistant chief clerk to the general superintendent, Lines West, chief clerk to the superintendent of transportation of the Hornell region, and office manager for the manager of the Hornell region. In May, 1922, he was advanced to regional auditor for the Hornell region and later in the same year he was made assistant chief clerk in the office of the vice-president at Jersey City, N. J. Next Mr. Barber was sent to Chicago as office manager for the Chicago region, being appointed chief clerk to the vice-president at that point in 1923. In 1926 he was further advanced to general yardmaster at Chicago, then being appointed trainmaster at Huntington, Ind. He returned to Chicago as assistant superintendent in 1928 and on January 20, 1930, he was appointed superintendent at Meadville, Pa., later being transferred to Salamanca, N. Y., and then to Buffalo, being located at the latter point at the time of his recent promotion to assistant general manager.

FINANCIAL, LEGAL AND ACCOUNTING

Lowell M. Greenlaw, general attorney of the Pullman Company, has been elected general counsel, with headquarters as before at Chicago.

S. F. Bratager, who has been appointed general claim agent of the Minneapolis, St. Paul & Sault Ste. Marie, first entered the service of this company on October 14, 1909, as a clerk. Three years later he was advanced to traveling freight agent, which position he held until January 1, 1927, when he was made assistant to the claims attorney. Early in 1932 Mr. Bratager was appointed claims attorney, which position he was holding at the time of his appointment as general claim agent, with headquarters at Minneapolis, Minn.

A. V. B. Gilbert, assistant secretary, acting treasurer and purchasing agent of the Atlanta, Birmingham & Coast, with headquarters at Atlanta, Ga., has been appointed treasurer of the company and has been relieved of the duties of purchasing agent.

TRAFFIC

F. G. Minnick has been appointed to the newly-created position of coal freight agent of the Pittsburgh & West Virginia, with headquarters at Pittsburgh, Pa.

J. O. Klapp has been appointed to the newly-created position of general agent, perishable freight, of the Minneapolis, St. Paul & Sault Ste. Marie, with headquarters at Minneapolis, Minn.

ENGINEERING AND SIGNALING

W. W. Portser, division engineer of the Wilkes-Barre division of the Pennsylvania, with headquarters at Sunbury, Pa., has been transferred to the Grand Rapids division, at Grand Rapids, Mich., succeeding **J. H. Schilling,** who in turn has been transferred to Sunbury.

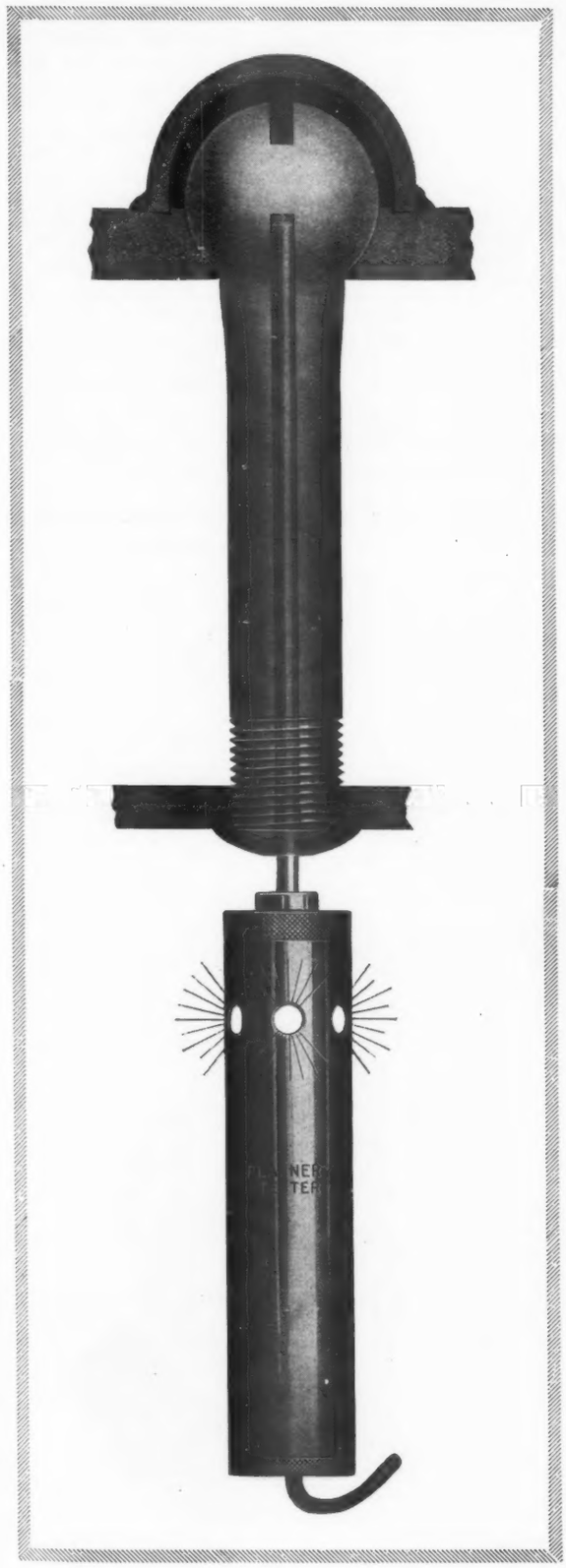
R. E. Gallagher, whose appointment as electrical engineer of the Louisville & Nashville was announced in the *Railway Age,* of May 26, entered railway service after graduation from college, in the elec-



R. E. Gallagher

trical department of the Baltimore & Ohio, where he was employed for a period of about 10 years. Later, he engaged in electrical contracting work in the cities of Norfolk, Va., and Baltimore, Md. From 1914 to 1918, Mr. Gallagher was first assistant electrical engineer of the Seaboard Air Line. In 1918, he was appointed electrical engineer of the Seaboard. After serving in this capacity for several years, Mr. Gallagher accepted a position as sales engineer of the Middle West district of the Stone Franklin Company. In January, 1923, he was appointed assistant electrical engineer of the Louisville &

Continued on next left-hand page



WE wish to gratefully acknowledge the recognition given the merits of the Flannery Tell-Tale Bolt by the recent purchasers of new locomotives.

More than six years of exacting service on the largest and highest pressure boilers yet constructed has proven its

SAFETY - EFFICIENCY - ECONOMY

FLANNERY BOLT COMPANY

Bridgeville - Penna.

Nashville, remaining in this position until May 1, 1934, when he succeeded the late Charles Lee Kincaid, as electrical engineer.

MECHANICAL

C. O. Shull, assistant master mechanic of the Pittsburgh division of the Pennsylvania, has been promoted to master mechanic of the Chicago Terminal division, succeeding **D. K. Chase,** who has been transferred to the Pittsburgh division, with headquarters at Pittsburgh, Pa., succeeding **C. B. Gray,** deceased.

G. G. Lynch, mechanical engineer-equipment of the Atlantic Coast Line, with headquarters at Wilmington, N. C., has been appointed assistant to general superintendent of motive power, with the same headquarters, to succeed R. J. Turnbull, deceased. Mr. Lynch was educated in the Wilmington high school and at North Carolina State College, from which he graduated in 1905. He entered the service of the Atlantic Coast Line as mechanical draftsman in June, 1905, and two years later he was appointed supervisor of water softening plants for the system. He was mechanical draftsman in the office of the general superintendent of motive power from December, 1909, to September, 1918, when he was appointed chief draftsman. He became assistant mechanical engineer in January, 1925, and was promoted to the position of mechanical engineer-equipment in September, 1929, serving in that position until his recent promotion.

PURCHASES AND STORES

F. C. Turner, traveling storekeeper of the Northern Pacific, with headquarters at Parkwater, Wash., has been promoted to assistant general storekeeper with headquarters at South Tacoma, Wash., to succeed **S. H. Robson,** who has retired under the pension rules of the company.

A. H. Lillengren, who has been appointed purchasing agent of the Great Northern, with headquarters at St. Paul, Minn., was born on July 20, 1877, at Stillwater, Minn. He entered the service of the Great Northern in December, 1896, as a clerk in the office of the auditor of passenger receipts, being transferred to the purchasing department three years later. In October, 1911, Mr. Lillengren left railway service to enter the contracting business on the Pacific Coast, and in April, 1912, he became purchasing agent of the Minneapolis Steel & Machinery Company at Minneapolis, Minn. He re-entered the purchasing department of the Great Northern in December, 1912, and was advanced through various positions to that of assistant purchasing agent in 1918. Mr. Lillengren was appointed acting purchasing agent on January 1, 1934, which position he was holding at the time of his recent appointment as purchasing agent.

OBITUARY

E. D. Hawley, superintendent of transportation of the Pere Marquette. with headquarters at Detroit, Mich., died on June 25.

Vernon L. Thompson, secretary of the Gulf, Mobile & Northern, with headquarters at Mobile, Ala., was drowned on June 10 when a boat in which he was riding capsized.

E. E. LeGette, general eastern freight agent of the Atlantic Coast Line, with headquarters at New York, was killed on June 14 in Washington, D. C., when he fell from a train entering the Union Station tunnel in that city.

William H. Abel, who was passenger traffic manager of the Alton until February 1, 1934, when he was made special representative of this road and the Baltimore & Ohio at Chicago, died on June 27 at the age of 71.

Francis B. Freeman, who retired as chief engineer of the New York Central in September, 1933, died at his home in Orange, N. J., on June 14. Mr. Freeman was born on April 2, 1867, in Dublin, Ireland. He was educated at the Rathmines school and the Royal College of Science, Ireland, and entered railway service in January, 1886, as mechanical apprentice in the Inchecora shops of the Great Southern Railway of Ireland. The following year he entered the Horwich shops of the Lancashire & Yorkshire Railway of England. He attended the Royal College of Science (Ireland) from 1887 to 1889, after which he became construction engineer of the Loughrea & Ahymon Railway of Ireland. In 1890 he became construction assistant engineer of the Ballinrobe & Claremorris Railway. From 1891 to 1892, Mr. Freeman served consecutively as survey assistant engineer of the Westport & Mulraney Railway; construction sub-agent of the Claremorris & Collooney; construction sub-agent of the Westport & Mulraney; and in legal service on the Newmarket & Kanturk and the Tarlee & Dinglo Railway of Ireland. From the latter date until 1894, Mr. Freeman was assistant engineer for the firm of Kingsley & Brewer, civil engineers in New York, and served for a short time with the South Orange & Maplewood Street Railway. He entered the bridge department of the Erie as assistant engineer in 1894, remaining in that position until 1900 when he became chief draftsman for the New York Central & Hudson River. In 1901 Mr. Freeman was appointed assistant engineer in charge of design for the same road, then serving as assistant engineer of construction at Syracuse, N. Y. From 1902 to 1903, Mr. Freeman was engaged in other work, returning to the New York Central & Hudson River as assistant engineer of joint facilities and agreements on the latter date. In 1905 he became designing engineer and in 1907 he was promoted to engineer of construction of the same road. Mr. Freeman went with the Boston & Albany as chief engineer in 1909, remaining in that position until January, 1927, when he became chief engineer of the New York Central, lines Buffalo and East. Mr. Freeman served in the latter position continuously until September, 1933, when he retired from active service because of ill health.



Francis B. Freeman

R. E. M. Cowie Dies; Former Head of Express Agency

Robert E. M. Cowie, who retired in 1932 as president of the Railway Express Agency, died at his home at Altadena, Cal., on June 22, at the age of 71 years. Mr. Cowie was born in Scotland and came to the United States at the age of 16 years, where he obtained a position as a clerk in the office of the American Express Company at Cleveland, Ohio. In 1886 he was appointed secretary to the general superintendent at Cleveland, later going to Chicago where he served as secretary to the general manager and chief assistant to the vice-president. In 1906, Mr. Cowie was advanced to assistant general manager, Western departments, at Chicago and four years later he returned to Cleveland as manager, Central departments, later being made manager, Pacific departments. In January, 1915, he was advanced to vice-president, with headquarters at New York, remaining in that capacity when the express business of the American Express Company was taken over by the American Railway Express Company in 1918. He was elected president of the latter company in 1923 and remained in that capacity with the Railway Express Agency when it was formed in 1929 to take over the express business of the American Railway Express Company.



R. E. M. Cowie

GREATEST STABILIZATION

WITH

RESERVE CAPACITY

MINER TRUCK SPRING SNUBBERS in the recent American Railway Association special preliminary tests showed the *greatest car stabilization* and *highest reserve of resilient capacity*.

These valuable qualifications have been confirmed by service tests in which the Miner Snubber has demonstrated its *outstanding ability to protect lading* under actual operating conditions where maximum speeds, eccentric wheels and unyielding roadbeds prevail.



Stops excessive truck spring vibration

W. H. MINER, INC. CHICAGO

Eighteen million miles operated per flue failure

NINE years ago a large railroad commenced using the Nalco System of Water Treatment and has consistently extended its use since that time.

Today the mileage operated per flue failure is more than 18,000,000 as compared with 1,770,000 nine years ago . . . better than 1000% increase.

Locomotives are now operated on a 30 DAY WASHOUT BASIS as compared with washouts every round trip formerly.

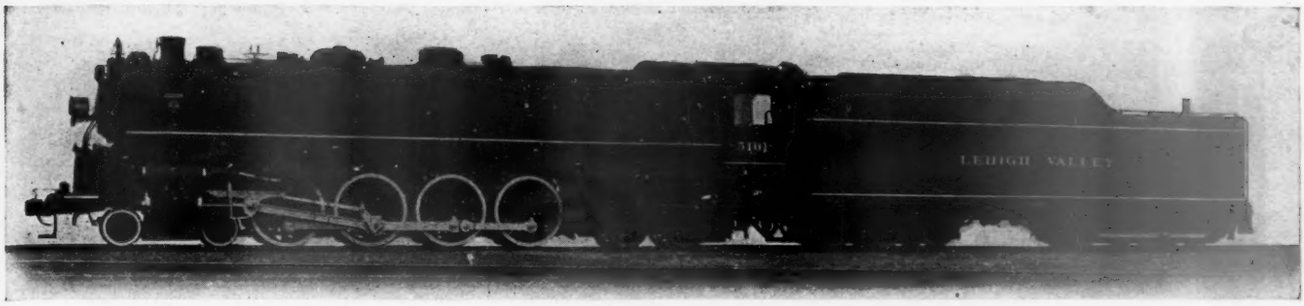
And . . . in the past four years there have been allowed 400 EXTENSIONS for locomotives beyond the Federal four year period (some locomotives now in their sixth year), while previously flues averaged only 30 months life.

Many other roads are effecting similar savings through the use of the Nalco System. A Nalco survey involves no obligation. Why not ask for it today.

NATIONAL ALUMINATE CORPORATION
6216 West 66th Place **Chicago, Illinois**

Nalco System includes a complete line of water treating chemicals, inexpensive and sturdy chemical proportioning equipment, modern laboratories with a skilled staff and an expert service organization that is constantly checking to make sure that the Nalco Treatment is producing maximum savings.

NALCO SYSTEM OF WATER TREATMENT



One of 22 Locomotives Which are Making Savings Equivalent to 38 Per Cent on the Investment for the Lehigh Valley.

LOCOMOTIVES

Modern Locomotives — replacing those that are obsolete — will be of tremendous benefit to the railroads, because —

I. *With the same weight on drivers they can haul twice the tonnage at speeds of 30 miles per hour and over, or the same tonnage at much higher average speeds.*

II. *Fuel and water rates per unit of work are substantially reduced.*

III. *Repair costs are lower on new power.*

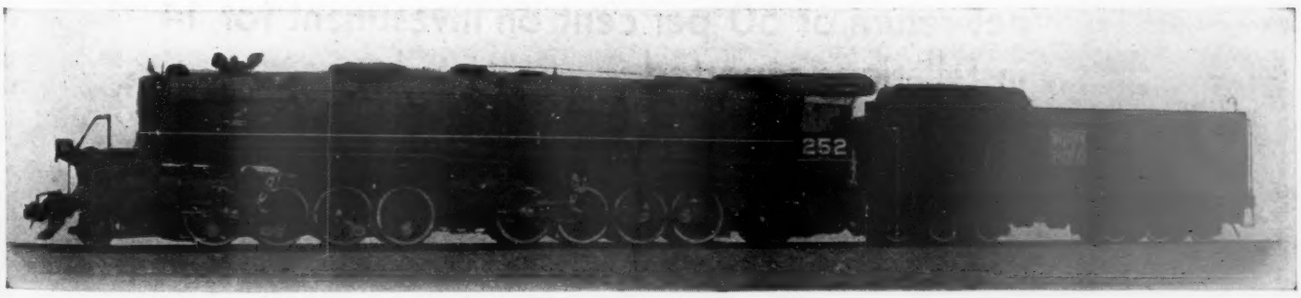
IV. *Higher speeds and lower costs enhance the competitive ability of the railroads and help to regain lost traffic.*

Few fields of investment for either public or private funds offer an equal certainty of more than paying their way.

Lower operating costs give better earnings!

LOCOMOTIVE WORKS

PHILADELPHIA



One of Six Locomotives Showing a Fuel Saving of Over 13 Per Cent in One Class of Service on the Western Pacific.



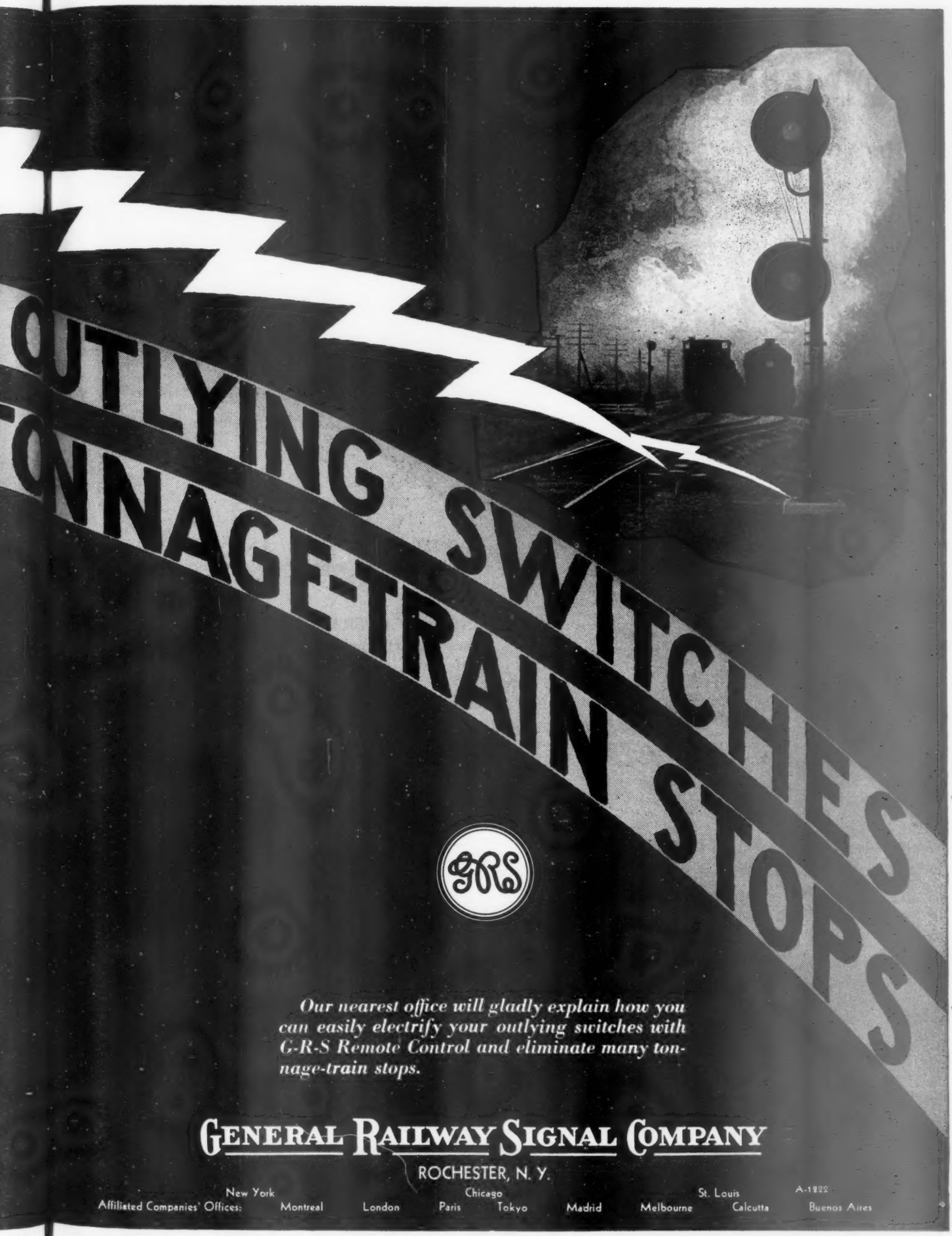
ELECTRIFY YOUR OU
AND ELIMINATE TON

You can eliminate delays, reduce operating costs and increase gross ton miles per train hour by equipping outlying switches with G-R-S Remote Control.

G-R-S Remote Control makes it possible to operate passing-siding switches, ends of double track, junctions, crossings, yard entrances and exits and similar layouts several miles or more distant from a convenient control point.

G-R-S Remote Control is self-liquidating and soon pays for itself from savings effected.

A. R. A. Committee Report shows average net return of 50 per cent on investment for 14 installations reported.



Our nearest office will gladly explain how you can easily electrify your outlying switches with G-R-S Remote Control and eliminate many tonnage-train stops.

GENERAL RAILWAY SIGNAL COMPANY

ROCHESTER, N. Y.

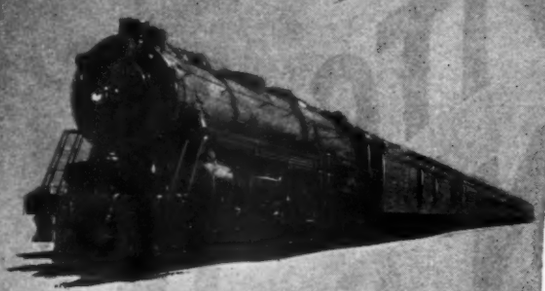
Affiliated Companies' Offices: New York, Montreal, London, Chicago, Paris, Tokyo, Madrid, St. Louis, Melbourne, Calcutta, Buenos Aires

A-1922

VAPOR PRODUCTS . . .

Provide Comfort and Economy for every type of Train Service





The art of passenger car heating and complete temperature regulation has kept pace with the development and improvement in transportation—that you may now ride in comfort, regardless of outside temperatures.

CONTROL PANELS AND THERMOSTATS for all types of Air Conditioning Systems.

STEAM GENERATING UNITS for steam heating of Stream-Line Trains and Gas-Electric Cars.

HEAT GENERATING UNITS for hot-air heating of Stream-Line Trains.

DUPLEX HEATERS for hot-water heating of Gas Electric cars.

THERMOSTATIC CONTROL VAPOR SYSTEM for steam heating of any type of car.

FLEXIBLE METALLIC CONDUITS for steam connections between cars.

STEAM COUPLERS, A.R.A. standard.

REDUCING VALVES, for steam, air or water, on locomotives and cars.

The correct automatic and uniform regulation of various passenger car temperatures, presents problems distinctly unique—best solved by experts in passenger car temperature regulation.

VAPOR CAR HEATING CO. Inc.

RAILWAY EXCHANGE, CHICAGO, ILLINOIS

CAR HEATING SPECIALTIES FURNISHED BY CAR HEATING SPECIALISTS

"COIL-ELLIPTIC" SPRINGS

22,000 CAR SETS IN SERVICE PREVENT LADING & EQUIPMENT DAMAGE

The Annual Average Bill for Perishable and Fragile Lading Damage is About

$20,000,000

As shown by the Reports of the A. R. A. Committee on Freight Claim Prevention.

The Annual Maintenance Chargeable to the Use of
UNCONTROLLED TRUCK SPRINGS
May Easily Equal Another $20,000,000

"COIL-ELLIPTIC" SPRINGS
SHOW HIGHEST PROTECTIVE FACTOR
WHEN USED WITH—

IMPROVED

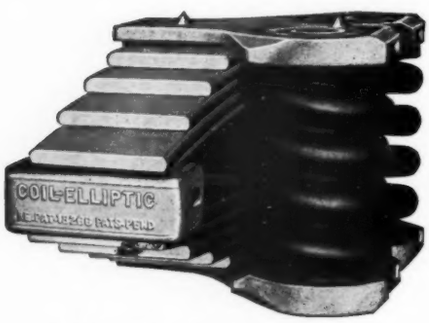
DOUBLE TRUSS TRUCKS

"COIL-ELLIPTIC" SPRINGS

A SCIENTIFIC DEVELOPMENT OF A CORRECTLY PROPORTIONED AND EFFICIENT TRUCK SPRING GROUP

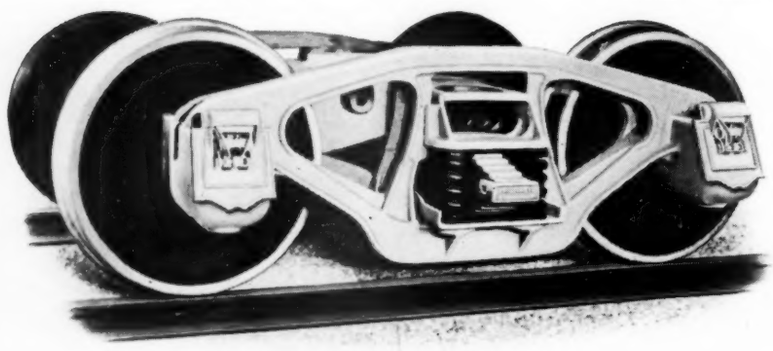


'COIL-ELLIPTIC" SPRING GROUP FOR IMPROVED DOUBLE TRUSS TRUCKS



"COIL-ELLIPTIC" SPRING GROUP FOR OLD TRUCKS

THE A.R.A. Committee on Freight Claim Prevention reports damage losses to such lading as fruits, vegetables, fresh meats, furniture, etc., amounting to approximately $20,000,000 annually. This large direct loss to the railroads represents 60 per cent of the total yearly damage loss and is attributed directly to what is commonly termed "car bounce" — the result of the uncontrolled action of plain helical coil truck springs. This $20,000,000 does not include or give any indication of the extent of the damage to rolling stock from the same cause. This might easily equal or exceed the figure quoted. The jolting and clatter of freight equipment mounted on ordinary trucks is familiar to everyone who has had to wait at a railway crossing. It should have been obvious that this condition was not helpful to lading, equipment or track and, under present day requirements for heavier lading and faster operating speeds, it becomes imperative that the railroads raise the standard of freight car riding quality and consider the freight truck from some other standpoint than that of first cost.



IMPROVED DOUBLE TRUSS TRUCK

The manufacturers of "Coil-Elliptic" Springs and Double Truss Trucks believe that the cost of the maximum riding quality which is obtainable through their combination is amply justified by the reduction in damage and annual charges in which their use results. The "Coil-Elliptic" spring group is merely a scientifically determined combination of familiar elements involving no additional mechanism subject to wear and uncertain as to the continuation of original efficiency. They are gratified that their claims for greater initial efficiency are

IMPROVED

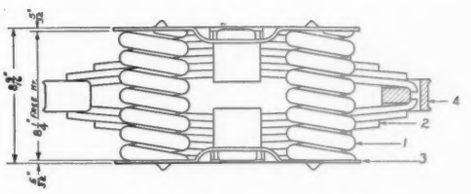
DOUBLE TRUSS TRUCKS

IMPROVED

DOUBLE TRUSS TRUCKS

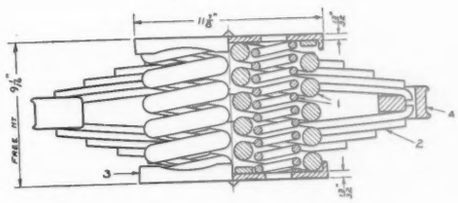
COMPREHENSIVE TESTS DETERMINE THE RIDING CHARACTERISTICS OF TRUCK SPRINGS

upheld by the report of the road and laboratory tests conducted by the Car Construction Committee of the A.R.A., abstracts from which appear in the following pages. Also, they are confident that the endurance tests now in progress under the same auspices will uphold their contention of longer effective life for the "Coil-Elliptic" group over that of any cheaper substitute.



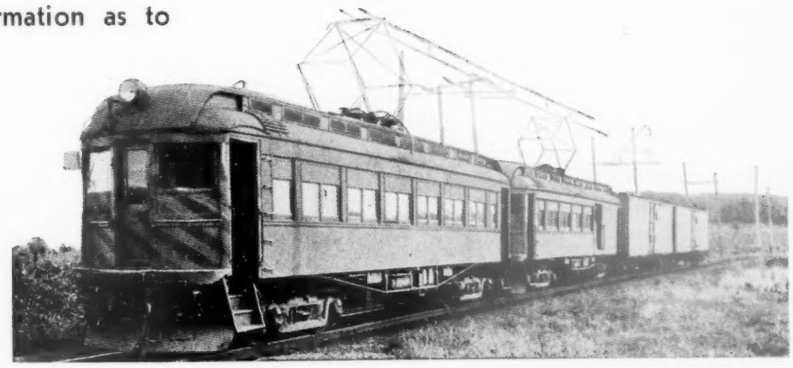
"COIL-ELLIPTIC" SPRINGS FOR DOUBLE TRUSS TRUCKS

In 1933 this Committee conducted comprehensive tests to determine the riding characteristics of existing truck springs, and to ascertain to what extent the riding qualities could be improved by existing devices. The "Coil-Elliptic" Springs and the Improved Double Truss Truck were tested with other devices designated as friction trucks. The primary purpose of the investigation was to determine the extent to which the devices tested would reduce the damage to lading and to the car equipment caused by vertical oscillation of the truck springs and car body.



"COIL-ELLIPTIC" SPRINGS FOR CONVENTIONAL TRUCKS

The riding-qualities tests were supplemented by laboratory tests, following which the various devices were placed in service under refrigerator cars to obtain information as to their endurance qualities. The purpose of the laboratory work was, first, to secure measurements and performance records of the devices when they were new, which could be used to detect changes in characteristics as they developed in service and, second, to develop, if possible, some satisfactory laboratory test that would be an index of riding qualities.



A.R.A. SPECIAL TEST TRAIN

"COIL-ELLIPTIC" SPRINGS

IMPROVED

DOUBLE TRUSS TRUCKS

THE "COIL-ELLIPTIC" SPRINGS SHOW LOWEST LADING DAMAGE FACTORS IN EACH GROUP



CAR "A" AND CAR "B"

THROUGHOUT the series of tests, one car designated as car "A" was used for testing the new devices and trucks, while the other car, car "B", was kept as a yardstick, using only the 1933 Standard A.R.A. coil springs.

The effectiveness of the different test devices installed in car "A" in improving riding qualities is shown in the table reproduced below. For each device at each test load there is given a lading damage factor for car "A" and also for car "B."

It is very significant that the test results show "Coil-Elliptic" Springs for conventional trucks and Double Truss Trucks to have the lowest lading damage factor of all in their respective groups. A low value of lading damage factor indicates smooth riding qualities, and a high value indicates rough riding qualities. Test conditions were rigidly controlled so as to make the results directly comparable. The accompanying curves taken from the report demonstrate clearly the vast superiority of "Coil-Elliptic" Springs for conventional trucks over the 1933 Standard A.R.A. coil springs, both at half and full loads, and the further superiority of the "Coil-Elliptic" group designed for the Improved Double Truss Truck

TABLE NO. 1
COMPARATIVE SUMMARY OF LADING DAMAGE FACTORS BASED ON
AVERAGE RESULTS OF ONE ROUND TRIP - ROCHESTER TO AVON AND RETURN - 37 MILES
TESTS CARS EQUIPPED WITH 40 - TON TRUCKS AND TRUE WHEELS

DEVICES FOR STANDARD TRUCKS (Installed on Car A only)	86,000 Lb on Rail — Lading Damage Factors			135,000 Lb. on Rail — Lading Damage Factors		
	Car A	1933 AAR Standard Coil Springs Car B *	Car A per cent of Car B	Car A	1933 AAR Standard Coil Springs Car B *	Car A per cent of Car B
1933 Standard A.R.A. Coil Springs - Class C	(Data not comparable account not reaching high enough speed.)			5,637	6,686	84.3%
Old Standard A.R.A. Coil Springs - Class C	8,760	18,721	46.8%	(Springs went solid at high Speed.)		
Barber Friction Truck Springs - Type No. 3	5,478	11,319	48.4%	(Retaining bolt broke during test, rendering device inoperative.)		
Cardwell Friction Bolster Spring - Type A	1,076	19,538	5.5%	677	6,683	10.1%
Coil-Elliptic Springs for Conventional Trucks	748	21,608	3.5%	501	7,046	7.1%
Edgewater Ring Spring Truck Spring - J-63-K	3,116	16,986	18.3%	1,792	7,313	24.6%
Frost Friction Truck Spring	10,069	20,389	49.3%	4,185	6,701	62.5%
Holland Volute Spring - Dwg. FTR-A-119	1,449	17,620	8.3%	(Springs went solid at high speed.)		
Miner Truck Spring Snubber - Class C-2	2,978	21,660	13.7%	1,323	5,428	24.4%
National Car Stabilizer - Type F-2-A	1,172	27,056	4.4%	800	6,736	11.9%
SPECIAL TYPES OF TRUCKS (Installed on Car A only)						
Barber Stabilized Truck	901	15,211	5.9%	1,170	6,779	17.2%
Coil-Elliptic Springs for Double Truss Trucks	630	16,796	3.8%	283	7,091	4.0%
Goodwin Car Stabilizer Truck	NOT TESTED			865	7,475	11.6%
National Type B "Coileaf" Truck	1,908	19,416	9.8%	481	6,500	7.4%

Note: The low-value Lading Damage Factors indicate smooth riding qualities and the high-value factors rough riding qualities. The table is given for matter of information and not intended to be used as a rating. Complete information will not be available until endurance tests are completed.

* The variation in the Lading Damage Factors for Car B, which was always equipped with 1933 A.R.A. Standard Coil Springs was due in part to the variable influence of the stabilizing device on Car A. This influence was apparent when couplers of the two cars were under tension or compression.

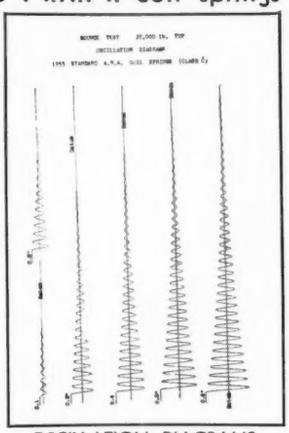
"COIL-ELLIPTIC" SPRINGS

"COIL-ELLIPTIC" SPRINGS

COMPARATIVE TESTS SHOW "COIL-ELLIPTIC" SPRING SETS TO BE FREE FROM HARMONIC BUILD-UP

for new equipment. In the compilation of results shown in Figure 237 on the next page, the performance of both "Coil-Elliptic" groups is outstanding when compared with the performance of all other competing devices in these two classes.

The oscillation diagrams obtained from the bounce test show how violently oscillations occur with the 1933 A.R.A. coil springs — and how effectively oscillations are dampened-out by the "Coil-Elliptic" spring group.

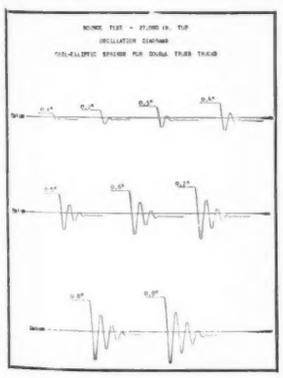


OSCILLATION DIAGRAMS
1933 STANDARD A.R.A.
COIL SPRINGS (CLASS C)

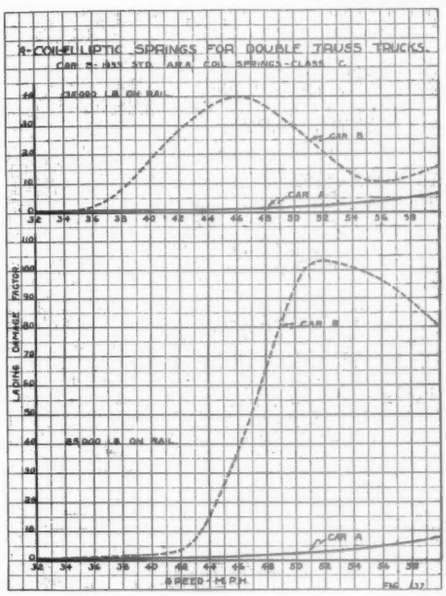
The following are excerpts from the discussion of results:

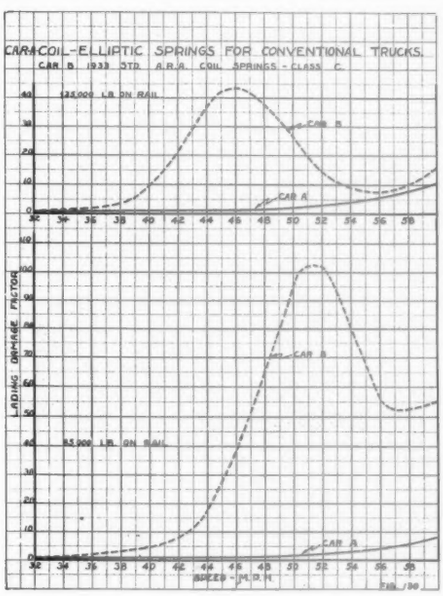
"The data shows that with practically true wheels and plain coil springs on freight cars vertical shocks of high lading damage power occur at certain speeds."

"With plain coil springs there was a critical speed in the neighborhood of 20 m.p.h. on the cars used in these tests — after this critical speed had been passed through, the cars rode nicely up to speeds of 36 m.p.h. for old coils with the heavy load and 40 m.p.h. with the light load and for the new coils 38 m.p.h. with the heavy load and 46 m.p.h. with the light load. As speed was increased above these values, the cars oscillated violently, producing lading damage effects as shown in accompanying curves."



OSCILLATION DIAGRAMS
"COIL-ELLIPTIC" SPRINGS
FOR DOUBLE TRUSS TRUCKS





IMPROVED

DOUBLE TRUSS TRUCKS

"COIL-ELLIPTIC" SPRINGS and IMPROVED DOUBLE TRUSS TRUCKS

"COIL-ELLIPTIC" SPRINGS FOR CONVENTIONAL TRUCKS AND DOUBLE TRUSS TRUCKS PRACTICALLY *ELIMINATE BOUNCING*

THE Committee in its report makes quite clear its conclusion that either the 1933 or the old standard A.R.A. coil springs alone develop vertical oscillations which are more pronounced with lighter loads and therefore more damaging to fragile lading. As the following excerpt from the discussion of the test results will show, the Committee naturally refrains from expressing any opinion as to the rating of the competing stabilizing devices from the standpoint of continued efficiency pending the conclusion of the endurance tests:

"These tests show that freight cars equipped with 1933 Standard A.R.A. or old standard A.R.A. coil springs develop bouncing at critical speeds, which is more pronounced at half load than at full load. This bouncing can be reduced or practically eliminated by the use of various devices in conventional trucks or by special trucks as shown in the comparison, Fig. 237. How long these devices will remain operative and effective is being determined by the service tests, which are now in progress. The use of these devices should effect large savings by the reduction of vertical oscillation in cars that operate at speeds above 36 miles per hour if wheels are true and at lower speeds if wheels are not true."

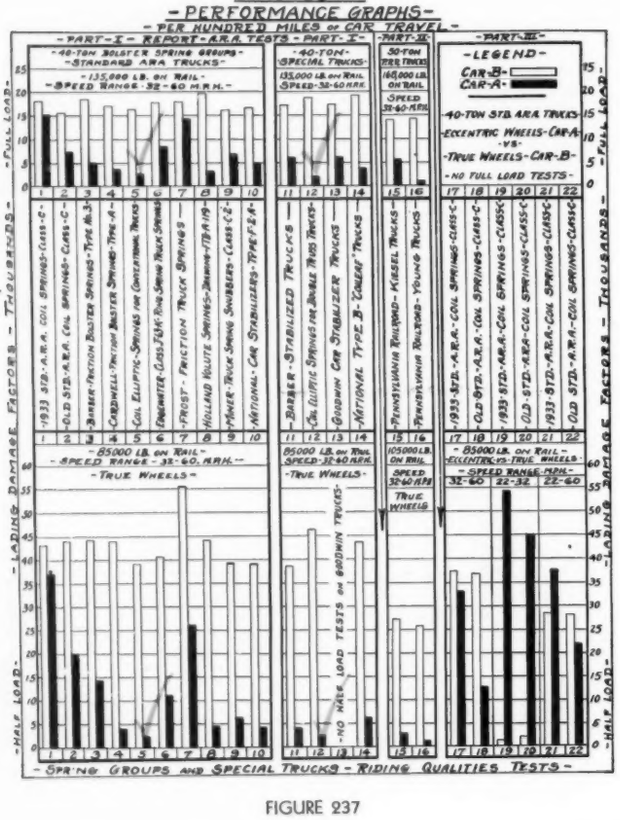


FIGURE 237

The results of these official tests speak for themselves. "Coil-Elliptic" Springs especially when used with the Double Truss Truck save many times their cost in the elimination or reduction of damage claims, in decreased maintenance and lengthened life of equipment. The preventable losses resulting from uncontrolled springs are too enormous to justify the use of anything but the most efficient corrective. To attempt to apply corrective measures on the basis of first cost is merely to repeat the expensive policy which forced the use of plain helical coils because they were cheap. Railroad operating and mechanical men understand elliptic springs and how to care for them. A cheaper and less efficient substitute for "Coil-Elliptic" may prove to be only an item of additional expense.

LICENSED SPRING and TRUCK MANUFACTURERS

AMERICAN SPIRAL SPRING & MFG. CO.	Pittsburg, Pa.
AMERICAN STEEL FOUNDRIES	Chicago, Ill.
FORT PITT SPRING CO.	Pittsburg, Pa.
PITTSBURG SPRING & STEEL CO.	Pittsburg, Pa.
RAILWAY STEEL SPRING CO.	New York, N. Y.
STANDARD STEEL WORKS CO.	Burnham, Mifflin Co., Pa.
UNION SPRING & MFG. CO.	Pittsburg, Pa.

AMERICAN STEEL FOUNDRIES	Chicago, Ill.
THE BETTENDORF COMPANY	Bettendorf, Iowa
BIRDSBORO STEEL FOUNDRY & MACH. CO.	Birdsboro, Pa.
THE BUCKEYE STEEL CASTING CO.	Columbus, Ohio
THE GOULD COUPLER CO.	New York, N. Y.
THE OHIO STEEL FOUNDRY CO.	Lima, Ohio
PITTSBURG STEEL FOUNDRY CORP.	Glassport, Pa.
PRESSED STEEL CAR CO.	McKees Rocks, Pa.
SCULLIN STEEL CO.	St. Louis, Mo.

NAMES for Freight Trains



HEAVIER RESPONSIBILITIES for Freight-Car Wheels

NOT so long ago freight trains took their time, ambling across the country apparently with small concern as to when they reached their destination. In those days freight-car wheels had a far easier job.

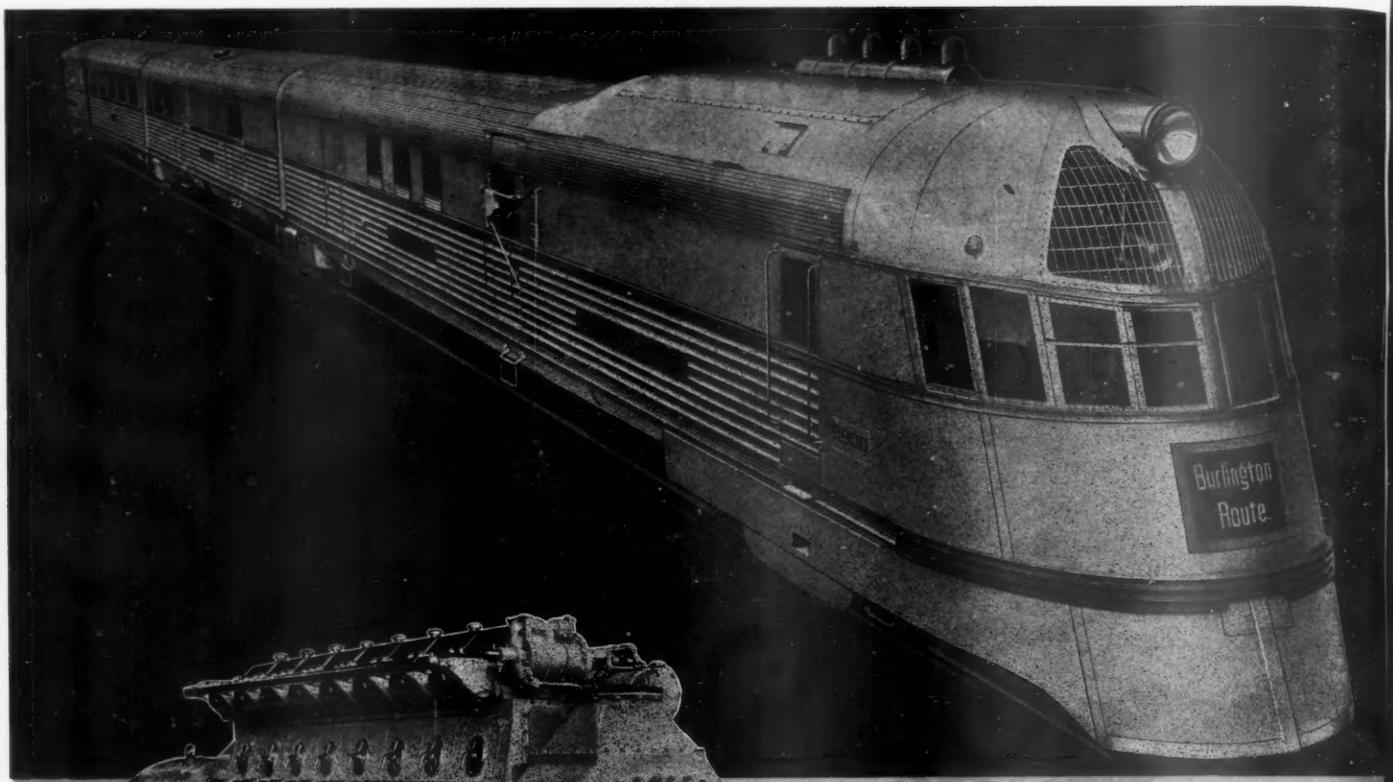
All that is changed now. Drawn by powerful high-wheel engines, freight trains have become swift greyhounds of the rails. Many of them, proudly carrying names that suggest their speed, are running virtually on passenger-train schedules.

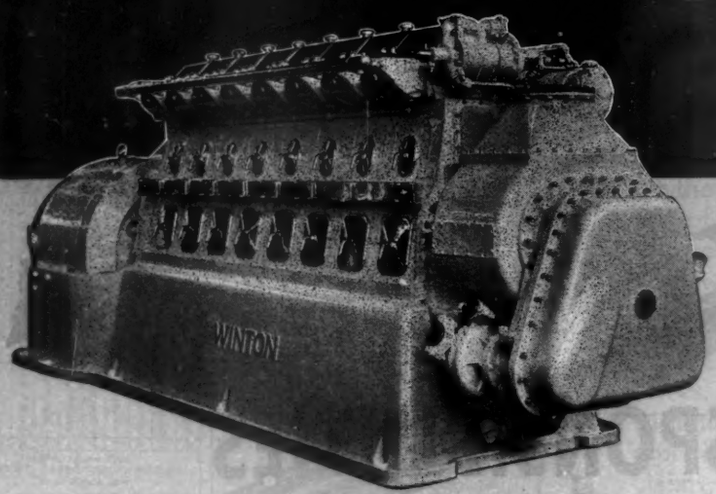
Today's rapid movement of freight calls emphatically for Bethlehem Wrought Steel Wheels. High-speed service holds no terrors for them. Their rugged strength and stubborn wearing properties fit Bethlehem Wrought Steel Wheels for any speeds or service now encountered or likely to come. *Bethlehem Steel Company, General Offices: Bethlehem, Pa.*



BETHLEHEM STEEL

BETHLEHEM WROUGHT STEEL WHEELS



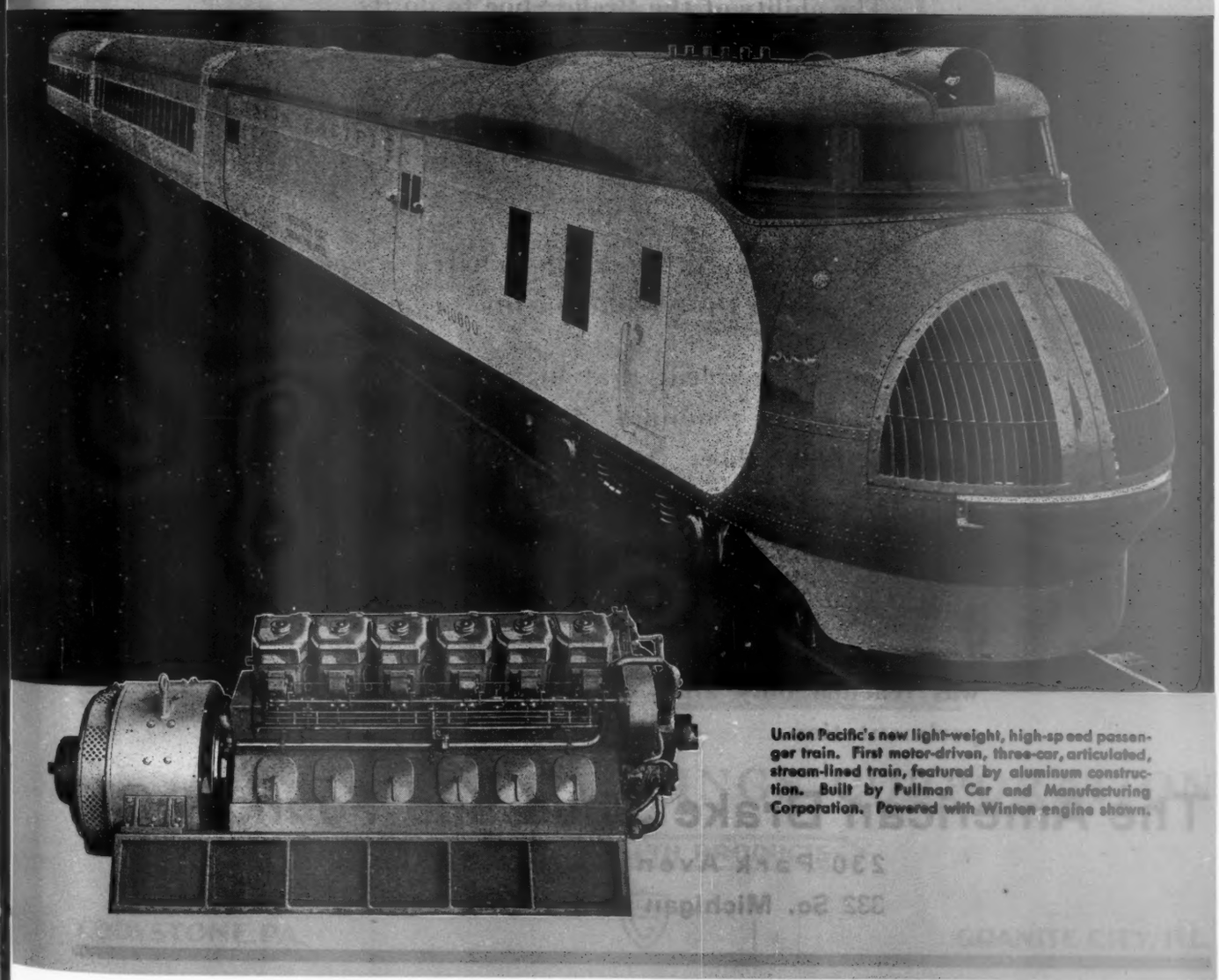


The Burlington "Zephyr". America's first Diesel all-steel stream-lined train. Built by the Edward G. Budd Manufacturing Company. Illustrated at left is the main engine, the famous two-cycle Winton Diesel, developed in collaboration with General Motors Research Laboratories.

IN powering these two epoch-making trains, Winton again demonstrates the engineering capacity that has placed Winton-powered rail cars in the service of all first-class American railroads. The installation of these new high-speed passenger trains means faster, cleaner, more comfortable passenger service. It means economy and a return to the rails of their fair share of the country's passenger traffic. In every detail, this new equipment keeps pace with the demands of the new era.

WINTON ENGINE CORPORATION, CLEVELAND, OHIO, U. S. A.
SUBSIDIARY OF GENERAL MOTORS CORPORATION

RAILROAD TRAINS OF THE *New Era* POWERED BY WINTON



Union Pacific's new light-weight, high-speed passenger train. First motor-driven, three-car, articulated, stream-lined train, featured by aluminum construction. Built by Pullman Car and Manufacturing Corporation. Powered with Winton engine shown.

BRAKE SHOE EFFICIENCY

BRAKE Shoe efficiency is based principally on two requirements:

1—The ability of the Brake Shoe to do its part in making the shortest and smoothest stop;

2—To perform this duty with a minimum amount of wear.

American "Diamond-S" Brake Shoes have the reputation of meeting these requirements.

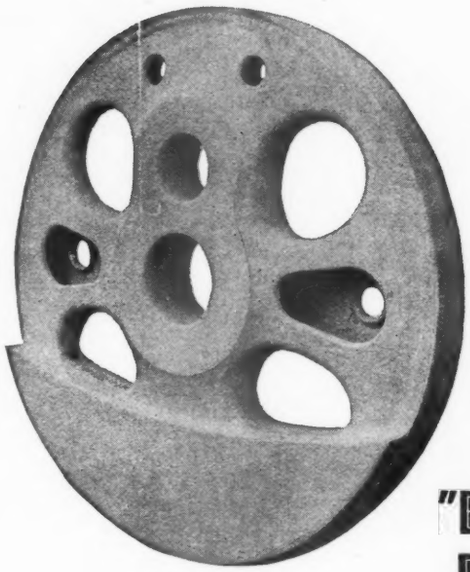
It was not an accident that high *co-efficient* of *friction* has been combined with maximum *life* in the same brake shoe. Nor was it by chance that steel back reinforcements were formed in certain shapes and lugs fastened in certain ways.

American Brake Shoes are not "just brake shoes." They are a product whose highly developed state was reached only after extensive study and experimentation.

The American Brake Shoe and Foundry Co.

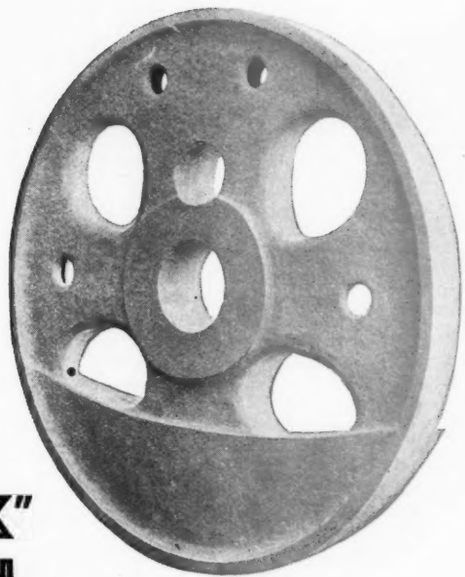
230 Park Avenue, New York
332 So. Michigan Avenue, Chicago

An Important Development
IN
Locomotive Driving Wheels



Outside View

"BOXPOK" DESIGN



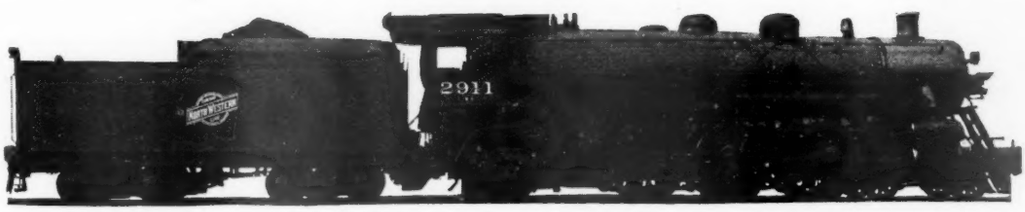
Inside View

Box section construction gives much greater strength with less weight; also permits better distribution of metal resulting in superior castings.

Box section rim construction provides more uniform tire support to prevent out-of-round wheels and flat spots, giving increased tire mileage.

This greatly improved design provides additional counter-balance, and cross balance where needed, allowing higher locomotive speeds with reduced track stresses.

Large openings in wheel centers give greater accessibility for inspection and lubrication.



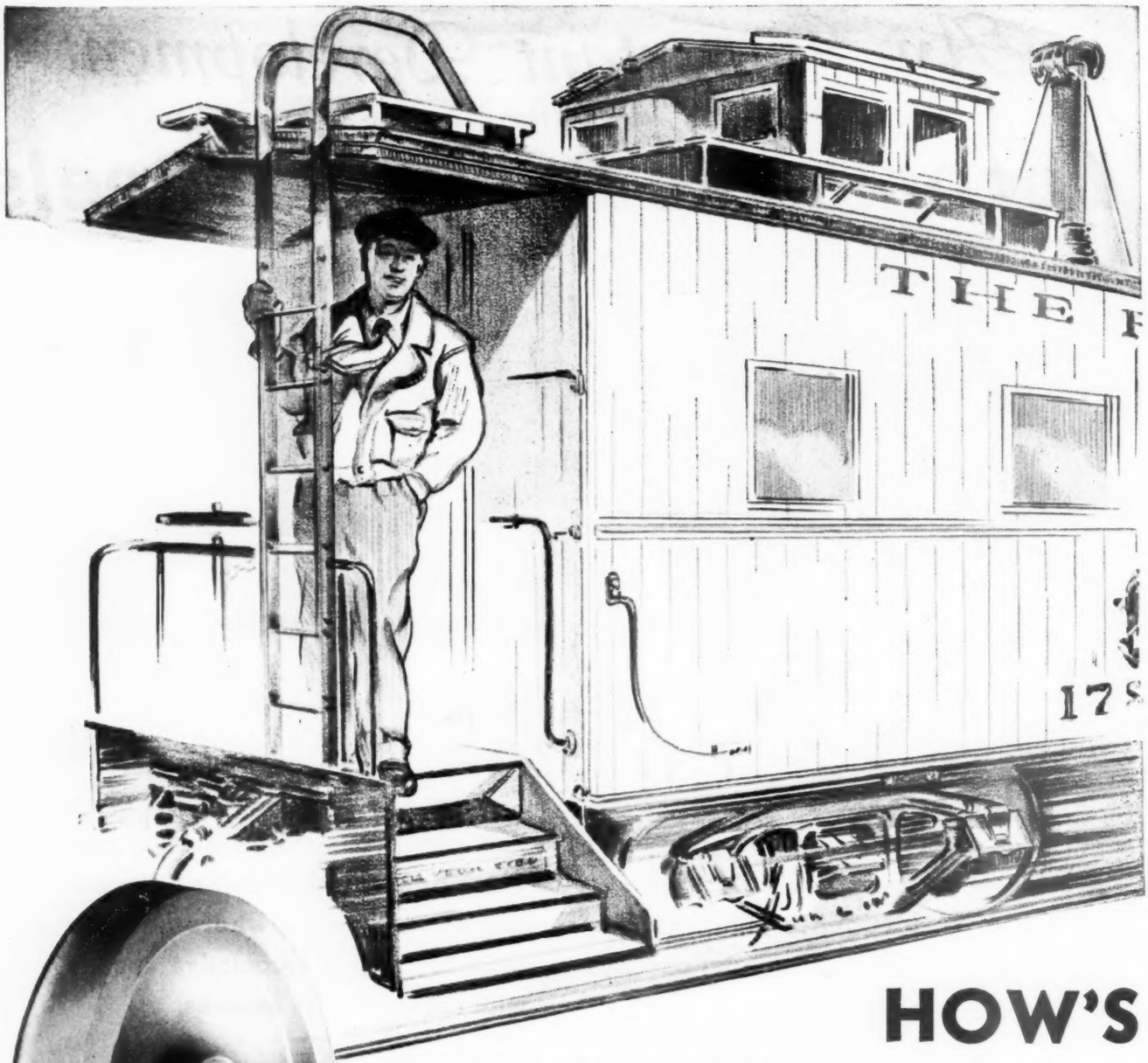
C. & N. W. Ry. Locomotive with Boxpok Wheel Centers Applied to Main Drivers.

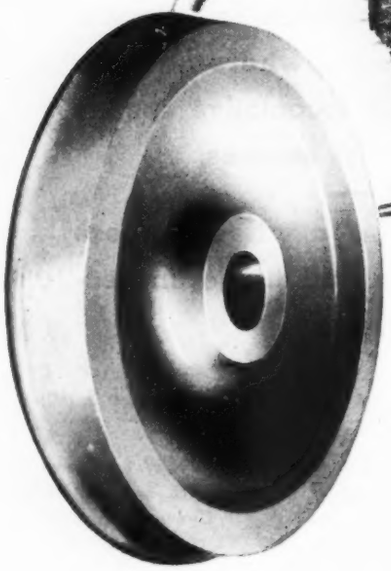
GENERAL STEEL CASTINGS CORPORATION

COMMONWEALTH PRODUCTS

TRADE MARK

EDDYSTONE, PA. GRANITE CITY, ILL.





HOW'S THEIR SONG TODAY?

For many a man who's spent his life in railroading there is no sweeter song than that sung by the wheels—when everything is rolling right. But there's no dirge more dismal than the clatter of a wheel that's wrong.

The business of making wheels that are satisfactory under today's exacting demands has been brought to a high point in the manufacture of Illinois Wrought Steel Wheels. A highly modern plant—a unique production process which assures elimination of all defective steel—a precise technical control—all combine to make the Illinois Wrought Steel Wheel uniformly safe, dependable, and economical.

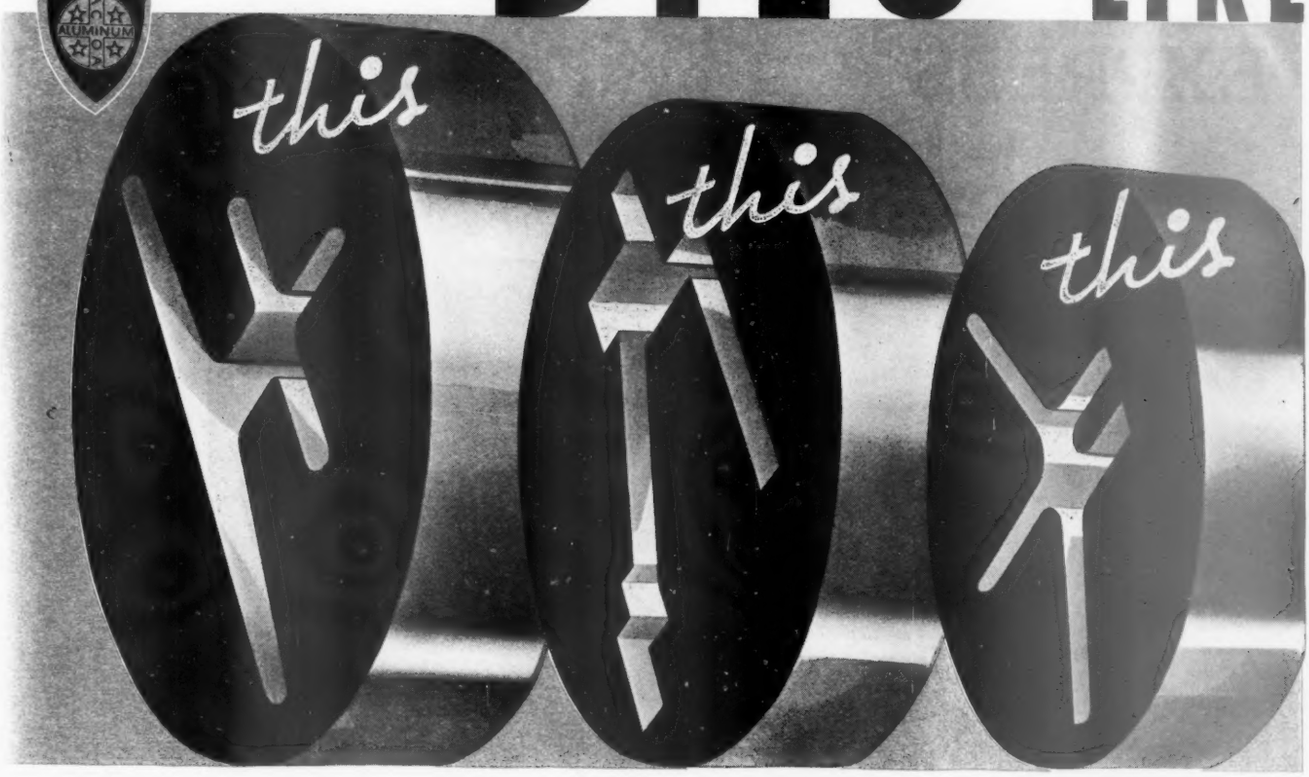
Both Rim Toughened or Oil Quenched wheels are available.

Illinois Steel Company
SUBSIDIARY OF UNITED STATES STEEL CORPORATION
208 South La Salle Street, Chicago, Illinois

ILLINOIS WROUGHT STEEL WHEELS

RIM TOUGHENED OR OIL QUENCHED

DIES LIKE



Have wiped out hundreds of CAN'T BE DONES

● ALCOA Aluminum—EXTRUDED—has put an end to hundreds of "Can't be done's"... witness Union Pacific's Railplane, Pullman's Observation Coaches, Clark's Auto tram.

For years the Railroad Designer has been hedged in by the limitations of standardized rolled sections of heavy metals. Today the picture has changed... radically... for practically any new design creation can be fully realized in ALCOA Aluminum.

Your designer can have practically any shape he may require ... rigid, strong, economical, calling for fewer joints and rivets.

Your designer can eliminate tons of dead weight with Alcoa Aluminum Alloys... strong as structural steel yet only one third the weight.

Your designer can have a wide variety of forgings, castings, bolts, screws, tubing, conduit and electrical conductors in Alcoa Aluminum.

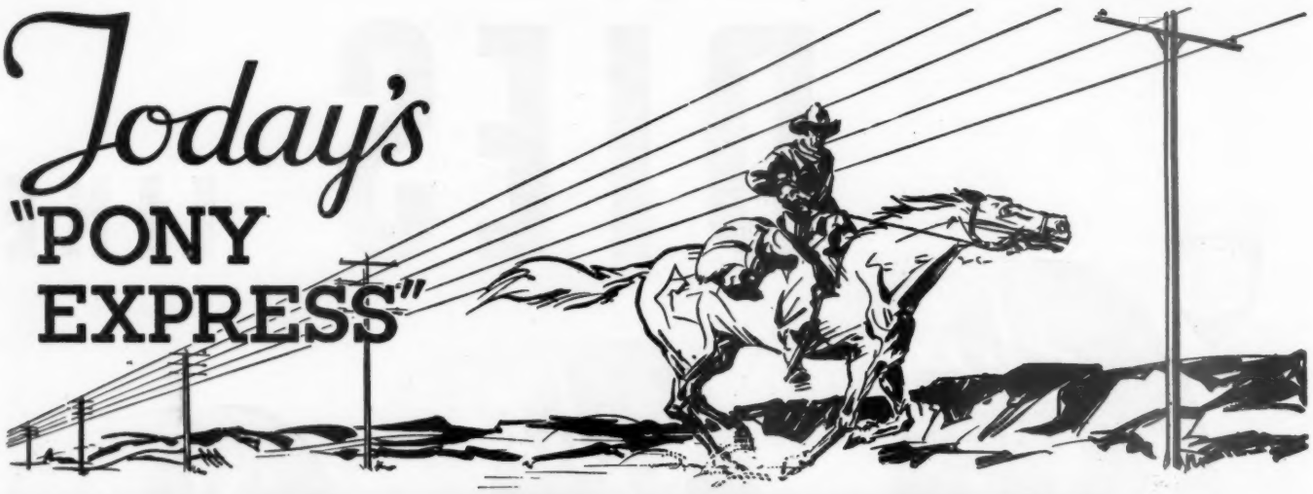
Your designer can obtain a long list of parts and assemblies made of Alcoa Aluminum from leading equipment makers.

And Your designer will have the unstinted cooperation of Aluminum Company of America engineers, for consultation on any problems which may arise.

ALUMINUM COMPANY OF AMERICA
1878 Gulf Building, PITTSBURGH, PA.

ALCOA · ALUMINUM

Today's "PONY EXPRESS"







The Button test—demonstrating the flexibility and tenacity of the zinc coating which is applied to Perfected Telephone and Telegraph Wires.

OVER the lonely prairies where once the Pony Riders galloped, today run millions of miles of Perfected Telephone and Telegraph Wire. Millions of miles of safe, consistent service—because of absolute uniformity in the wire itself. Uniformity such as only the world's largest producer of wire could build into a product. Perfected Telephone and Telegraph Wires are produced in the standard reliable brands—"Extra BB"—"BB" and "Steel"— each heavily and uniformly galvanized—assuring uninterrupted service. There is a type of Perfected Strand to meet every need—efficiently, dependably and economically. All our strand is so constructed that the strand may be cut at any point without making seizings. In construction work this is a time-saver and a great convenience.

1831 

1934

AMERICAN STEEL & WIRE COMPANY

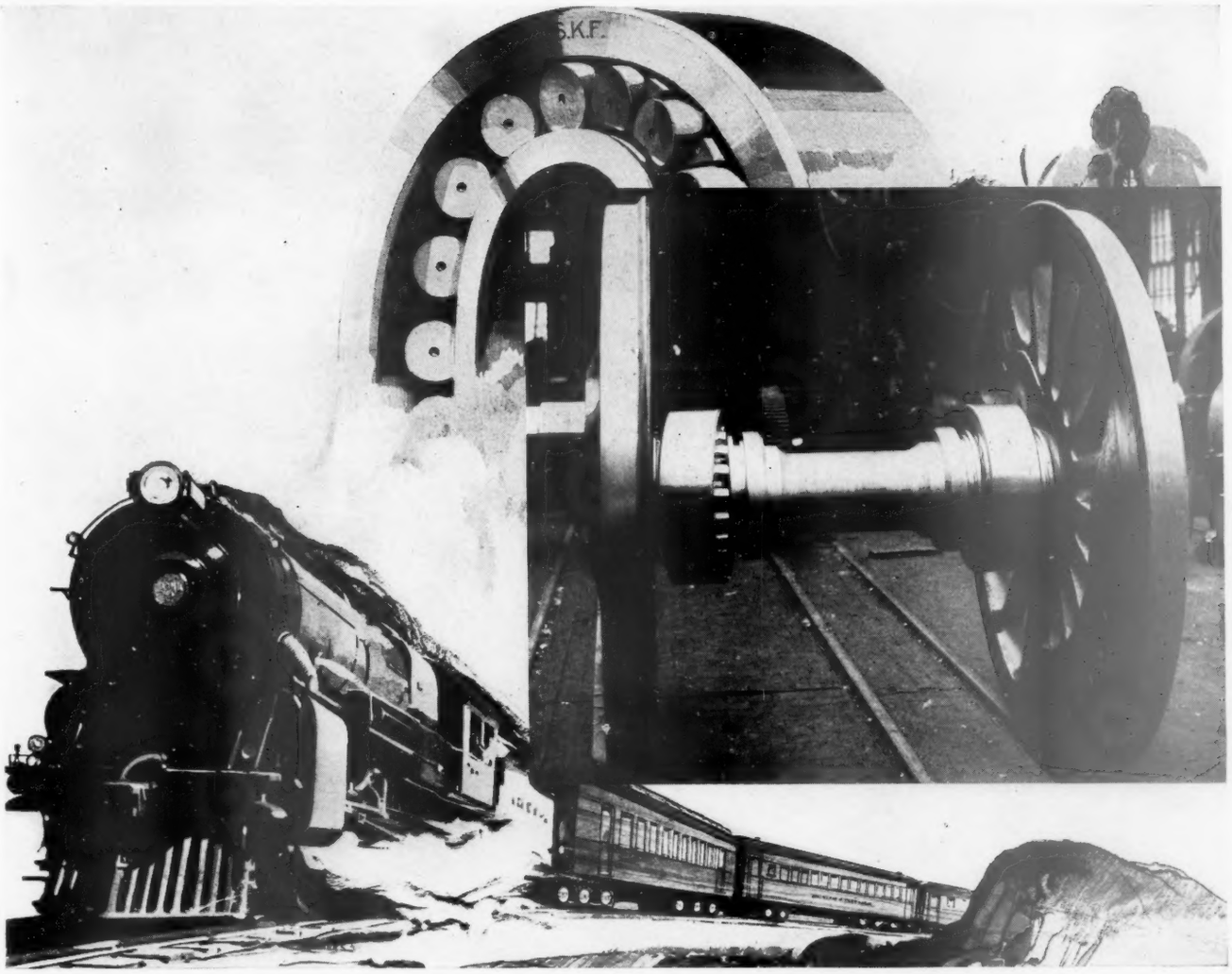
208 South La Salle Street, Chicago
94 Grove Street, Worcester

SUBSIDIARY OF UNITED STATES STEEL CORPORATION
AND ALL PRINCIPAL CITIES

Empire State Building, New York
First National Bank Building, Baltimore

Pacific Coast Distributors: Columbia Steel Company, Russ Bldg., San Francisco

Export Distributors: United States Steel Products Company, New York



DRIVERS

NEW YORK CENTRAL LINES

● SKF *SELF-ALIGNMENT gives DEPENDABILITY . . . the kind that makes FAST service from New York to Chicago in this N. Y. C. locomotive No. 5343.*

HERE'S A CLOSE-UP of the main driver of a J. 1 Hudson type locomotive No. 5343, the first railroad-owned passenger locomotive to be equipped with anti-friction bearings . . SKF Bearings! And this driver has been through two general shoppings . . 325,000 miles! . . *without any kind of bearing wear!*

Note the tilt of the outer race . . bearing flexibility like a ball-and-socket joint! That means *self-alignment!* And self-alignment is mighty important when a locomotive hits a curve. A lateral blow strikes the journal box . . is transmitted to the bearing, where SKF rollers are shaped to take sudden thrusts without damage.

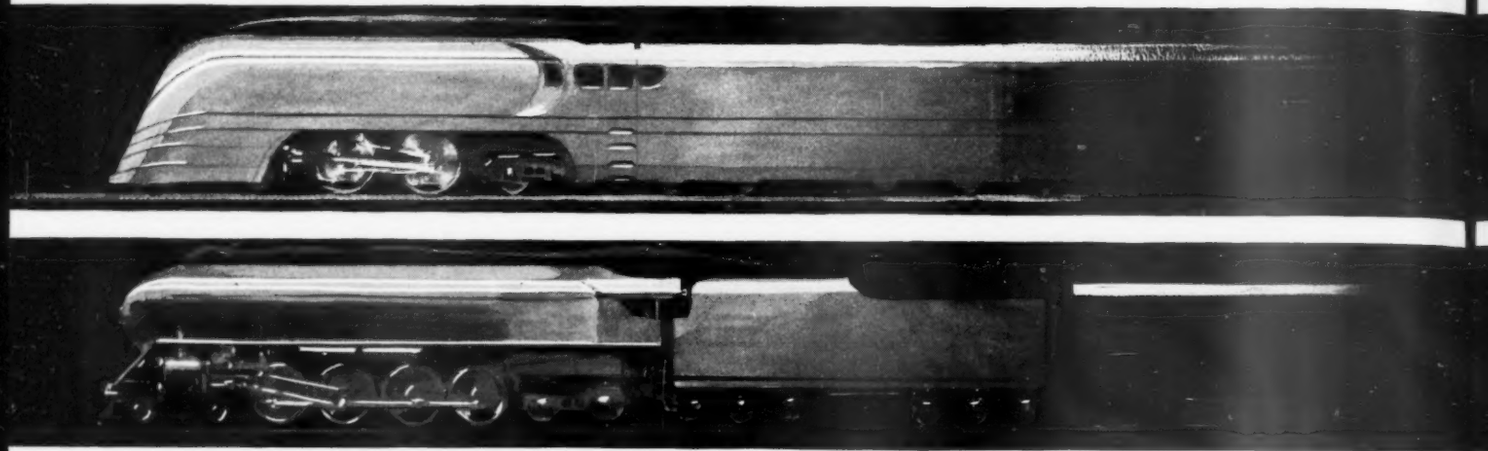
The SKF Bearing is a single self-contained unit. It requires no adjustments . . eliminates misalignment resulting from track irregularities . . does away with cramping or binding in the bearing. It takes any movement of truck or irregularity of truck *easily* . . without setting up undue stresses . . without scoring the journal. *This feature is exclusive in the SKF Journal Bearing!*

Because of these features and the good performance of 178 SKF engine truck applications, the New York Central Railroad in 1933 equipped all drivers of locomotive No. 5343 with SKF Journal Bearings. SKF INDUSTRIES, INC., Front St. & Erie Ave., Phila., Pa.

5346

SKF JOURNAL BEARINGS

AMERICAN LOCOMO



MODERNIZE to

30 CHURCH STREE

VOTIVE COMPANY

to ECONOMIZE

E · NEW YORK · N · Y ·

A Specialized Plant And Personnel Can Deliver Better RECLAIMED Springs At a Lower Cost . .



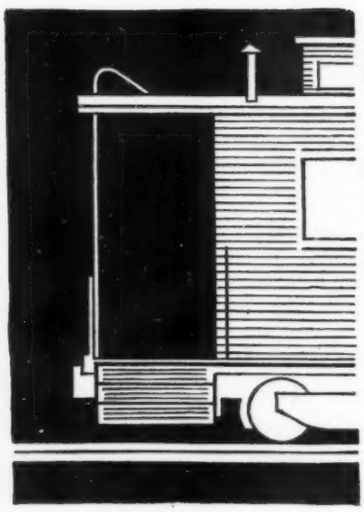


IS it wise for a railroad to reclaim its own springs when repairs of unquestionable value can be obtained more economically outside?

A reclaimed spring can and should be practically equal to a new one in uniformity, resiliency and performance. But it must be reworked and heat-treated as a new one. Otherwise it will be back again for repair long before it should.

It isn't only the cost of a repair that should be considered. It is the cost of repair multiplied by the number of times the spring is repaired for a given mileage. And to this figure must be added the cost of removing the broken spring plus the cost of reapplying the repaired spring.

We would welcome the opportunity of proving to you that "Railway" repaired springs can save you money.



American Locomotive Company

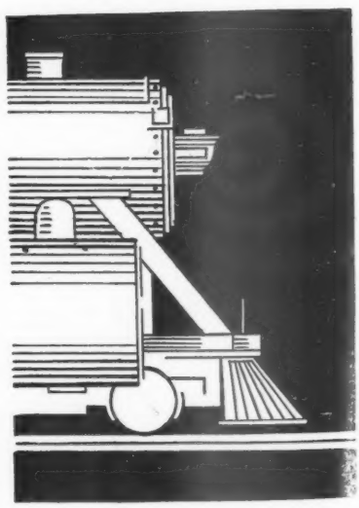
Railway Steel-Spring Division

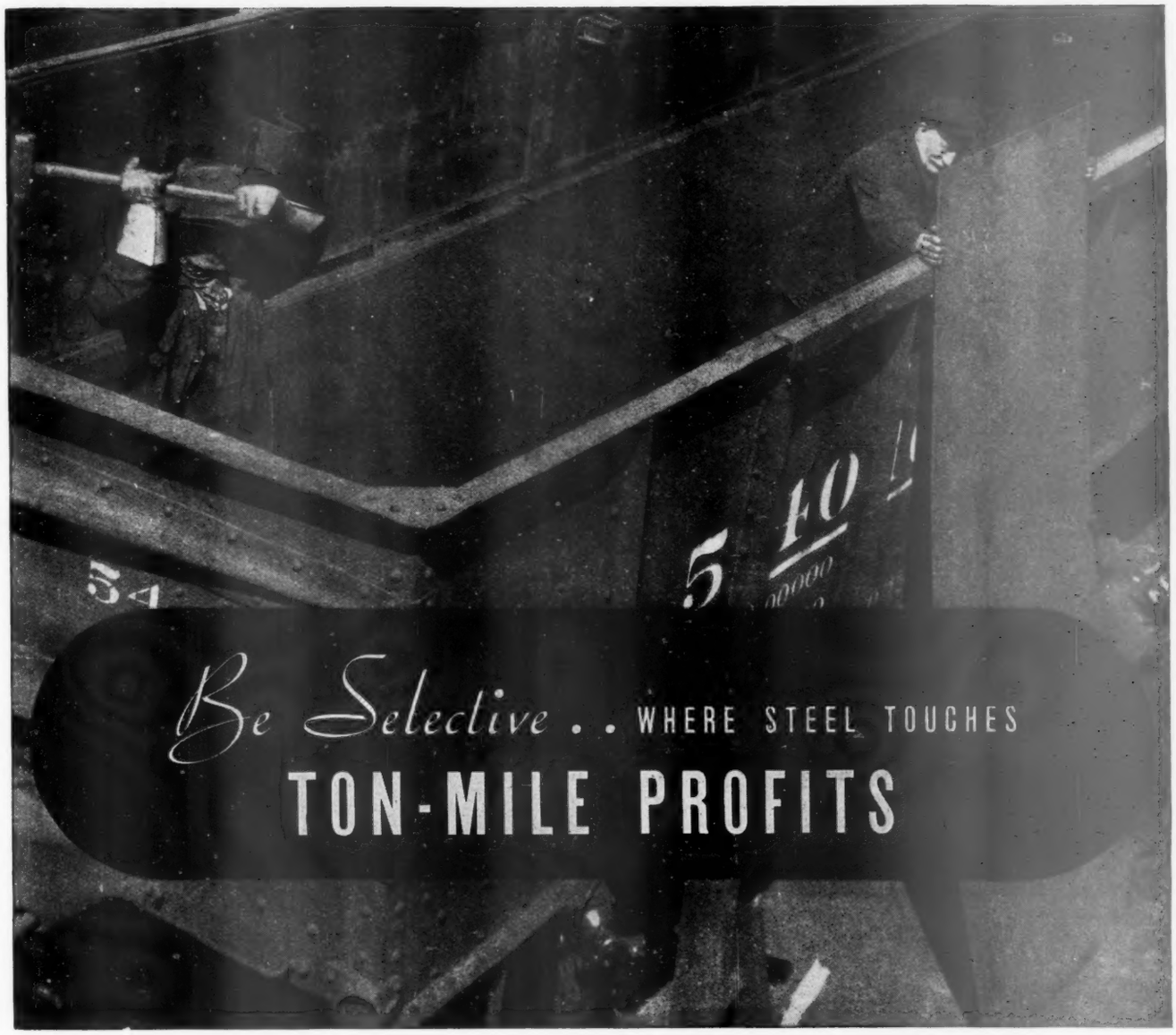
30 CHURCH ST., NEW YORK

BRANCH OFFICES:

Chicago, Ill.
Washington, D. C.
Cleveland, Ohio
Pittsburgh, Pa.
Montreal, Que.
St. Paul, Minn.
St. Louis, Mo.
Denver, Colo.
San Francisco, Cal.



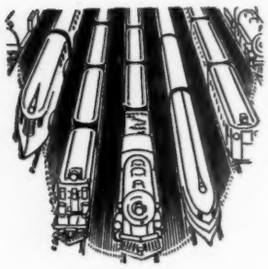




YOUR freight cars earn no money in the shops. • Still, ARMCO Sheets and Plates can help you curb the losses caused by too-frequent repairs and replacements; can help you gain greater ton-mile profits. • For utmost rust-resistance, you can use INGOT IRON, the highly-refined iron that for twenty-eight years has been cutting the railroad rust-bill. Then, there are ARMCO Copper-Bearing and Plain Steel Sheets and Plates, which cost less but give a full measure of service. All grades form readily, weld firmly, and hold paint. Here are tangible savings that you will convert into profits, dividends, during a long, useful life of your freight cars. • Let us help you realize these profits. Before you buy, talk with an experienced ARMCO MAN from our nearest office.

ARMCO RAILROAD SALES CO.
Subsidiary of The American Rolling Mill Company
Executive Offices: Middletown, Ohio
Chicago Cleveland New York
Philadelphia St. Louis San Francisco

ARMCO
WHEELS · SHEETS · PLATES
for every Railroad need



17 RAILROADS

NOW USE STURTEVANT AIR CONDITIONING EQUIPMENT!

On passenger cars of all the following railroad systems, Sturtevant fans or cooling coils, or both, now are in use:—

Boston & Maine	Great Northern	N. Y. C. & St. L.
C. B. & Q.	M. K. & T.	N.Y. N.H. & H.
Chicago & Northwestern	New York Central	Pennsylvania
C. R. I. & P.	Norfolk & Western	Seaboard Air Line
C. & E. I.	Northern Pacific	St. L. & S. F.
D. L. & W.		Wabash

There is a logical reason for this widespread use of Sturtevant Air Conditioning Equipment by railroads. It is the fact that this equipment has convincingly demonstrated its ability to fully meet the most exacting requirements of railroad service.

Available in complete systems, and as individual parts, such as fans, cooling coils, etc.

B. F. STURTEVANT CO., HYDE PARK, BOSTON, MASS.
Chicago, Ill., 400 North Michigan Avenue San Francisco, Cal., 681 Market Street
Branch Offices in Other Cities

Sturtevant
REG. U.S. PAT. OFF.

PIONEER MAKERS OF AIR CONDITIONING EQUIPMENT

40% BETTER TON MILE PERFORMANCE ON TIMKEN BEARINGS



This remarkable superiority has been demonstrated by two completely Timken Bearing Equipped class 4-8-4 locomotives over plain bearing locomotives of the same class and age on the Lackawanna Railroad.

These Timken-equipped engines have been operated in nightly passenger service between Hoboken and Buffalo for 1¾ years. They make 392 miles every night, and there has not been a single train detention or delay attributable to Timken Bearings.

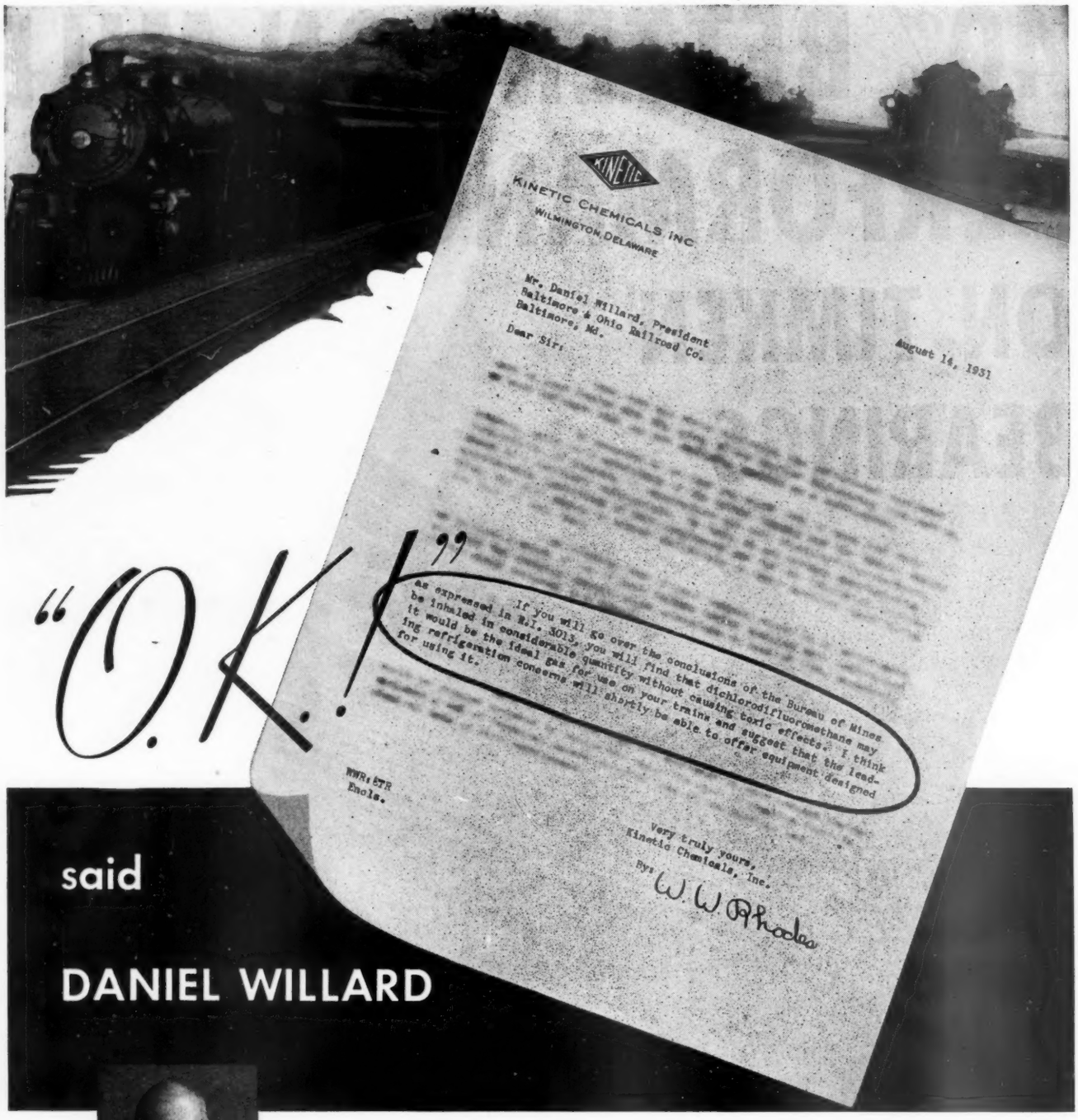


Largely as a result of the performance of these two Timken-equipped locomotives, the Lackawanna Railroad recently ordered Timken Bearings and boxes for all axles of 18 more class 4-8-4 locomotives which are to be built by The American Locomotive Company.

The advantages of Timken Tapered Roller Bearings are not restricted to new locomotives however. Timken Bearings can be applied to all axles of existing locomotives with similar success.

THE TIMKEN ROLLER BEARING COMPANY, CANTON, OHIO

TIMKEN *Tapered Roller* **BEARINGS**



said

DANIEL WILLARD



SAFENESS . . . complete comfort for passengers . . . and ease of equipment installation . . . these were the features Mr. Daniel Willard found in "Freon"!

"O.K.," he said. "B & O trains will be air-conditioned with Freon." They were. And last summer—due in great part to the safe, cool, comforting atmosphere of Pullman chair cars and sleepers—B & O trains increased their patronage and carried record crowds to Chicago's World's Fair. Even the "uppers" were frequently sold out!

On railroad trains and submarines, in office buildings, theatres and apartments—in buildings where furs are stored, in meat markets, delicatessens, florists' shops, in household refrigerators, there you will find "Freon." Non-toxic, odorless, non-flammable, affording maximum safeness in all respects—"Freon" is preferred today wherever a safe refrigerant is required.

FREON

REG. U. S. PAT. OFF.

a safe refrigerant

KINETIC CHEMICALS, INC., TENTH & MARKET STREETS, WILMINGTON, DELAWARE



9 Reasons for Making Chilled Car Wheels Your Standard

1. They possess the required safety factor at the lowest first cost.
2. The wearing surfaces of flange and tread have surplus bearing power to carry the heaviest loads.
3. Metal of the tread and flange has a maximum wearing value.
4. Wearing surface of flange and tread causes least abrasion to the rail.
5. Metal of the tread has greatest co-efficient of brake shoe friction.
6. Metal forming the tread removes the least metal from the brake shoe per unit of retardation.
7. Worn out wheels have high scrap value.
8. They are easily procured, because manufacturing plants are located near Railway Wheel Shops relieving railroads from carrying large stocks.
9. They carry a positive service guarantee.

MEMBERSHIP

1. Albany Car Wheel Co.
2. American Car & Fdry. Co.
3. Bass Fdry. & Machine Co.
4. Canada Iron Foundries, Ltd.
5. Canadian Car & Fdry. Co.
6. Central Car Wheel Co.
7. Cleveland Production Co.
8. Dickson Car Wheel Co.
9. Dominion Wheel & Fdries., Ltd.
10. Griffin Wheel Co.
11. Hannibal Car Wheel & Fdry. Co.
12. Lobdell Car Wheel Co.
13. Louisville Car Wheel & Ry. Sup. Co.
14. Marshall Car Wheel & Fdry. Co.
15. Maryland Car Wheel Co.
16. Mt. Vernon Car Mfg. Co.
17. New Orleans Car Wheel Co.
18. New York Car Wheel Co.
19. Pullman Car & Mfg. Corp.
20. Ramapo Fdry. & Wheel Works
21. Reading Car Wheel Co.
22. Southern Wheel Co.
23. Tredegar Iron Works

ASSOCIATION OF MANUFACTURERS OF CHILLED CAR WHEELS
332 S. MICHIGAN AVE. CHICAGO, ILLINOIS

Complete Continuous Dependable
Air Conditioning



Safety Equipped M. K. T. Lounge Car.

Carrier-Safety Air Conditioning—Safety Lighting Equipment and Fixtures.

IT is no longer a question of whether to install air conditioning equipment in Railway passenger cars. It is rather "What is the best type to install?"

The Carrier-Safety steam ejector system has been designed and built to give the complete result with dependability, safety and reasonable cost for installation and operation.

After exhaustive tests fifteen railroads have installed the Carrier-Safety system.

Before you decide upon any type of air conditioning call in the experts of our highly specialized organization to check your requirements.

THE SAFETY CAR HEATING & LIGHTING CO.

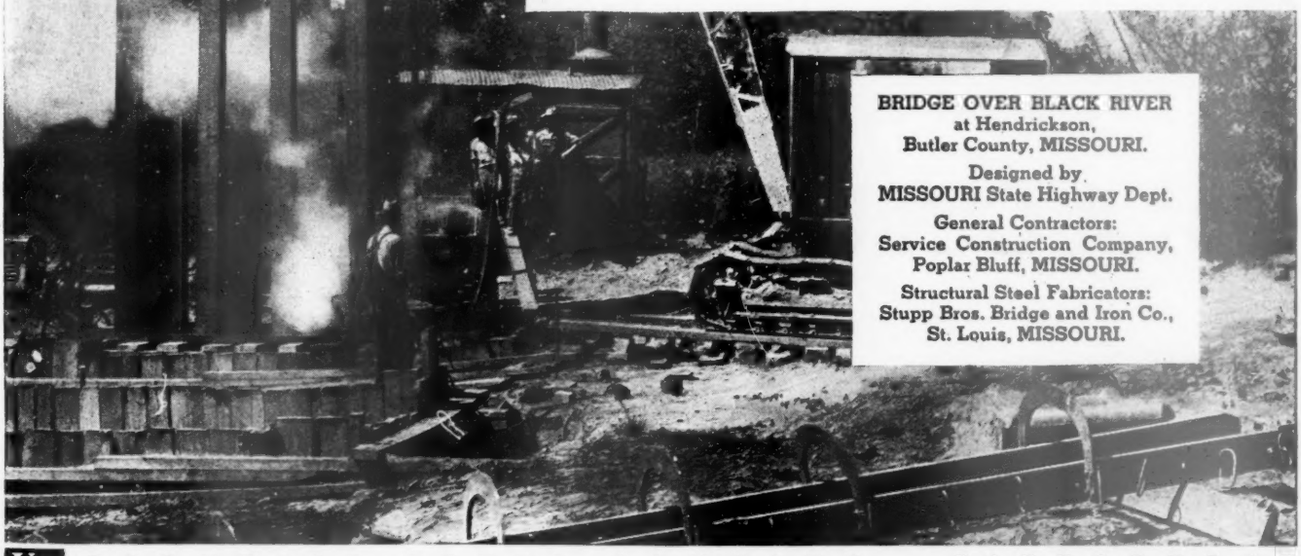
NEW YORK CHICAGO ST. LOUIS BOSTON
PHILADELPHIA SAN FRANCISCO MONTREAL

CB·SECTION STEEL BEARING PILES

show those from Missouri"

Penetration through 28 to 32 feet of cemented sand and gravel . . . that was the job so successfully accomplished by CB section steel bearing piles in the construction of the bridge over the Black River at Hendrickson, Butler County, MISSOURI. The illustration shows one of eight pile clusters of 10" CB 49# sections partially driven. Note the perfect alignment of the piles and the simplicity of swinging leads and driving rig. 107 CB section piles, totaling 5684 lineal feet, were driven to penetrations ranging from 42' 6" to 75'. The CB sections were furnished in 50', 55' and 60' lengths to be cut or spliced in the field as required. Piles were driven to resistances averaging ½" penetration under 100 blows of a 9-B2 McKiernan Terry hammer operating between 120 and 140 blows per minute, thus indicating an average safe carrying capacity of 65 tons per pile. • Carnegie engineers would like to discuss this important subject with you . . . to show you significant facts and figures.

271



BRIDGE OVER BLACK RIVER
at Hendrickson,
Butler County, MISSOURI.
Designed by
MISSOURI State Highway Dept.
General Contractors:
Service Construction Company,
Poplar Bluff, MISSOURI.
Structural Steel Fabricators:
Stupp Bros. Bridge and Iron Co.,
St. Louis, MISSOURI.

US STEEL CARNEGIE STEEL COMPANY • PITTSBURGH
• • • Subsidiary of United States Steel Corporation • • •

For SERVICE AND DELIVERY

MAGNUS METAL

Bronze Engine Castings, Satco Lining Material,
Car & Locomotive Journal Bearings

WHERE RECORDS ARE MADE YOU
WILL FIND MAGNUS PRODUCTS

"MAGNUS PRODUCTS ARE BRASS INSURANCE"

MAGNUS COMPANY

INCORPORATED

NEW YORK CHICAGO

WRITE *MAGNUS* IN YOUR SPECIFICATIONS

The Combustion Chamber SYPHON

HAS PROVEN ITS VALUE AS A

Safety Device

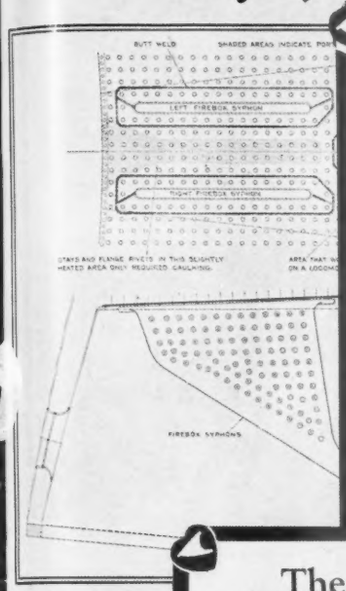
Reproduced from the Railway Age May 26, 1928

The Combustion Chamber

SYPHON

Has AGAIN Proved Its VALUE as a

SAFETY DEVICE



Reproduced from the Railway Age May 28, 1931

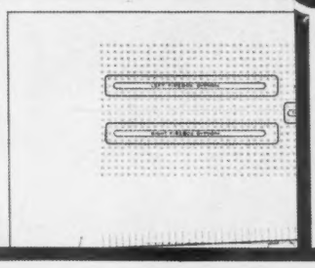
For the Third Time—

The Combustion Chamber

SYPHON

Has Proven Its Value as a

SAFETY DEVICE



Reproduced from the Railway Age Nov. 7, 1931

The Crown S

A similar lo
Non-Syphon
boiler explo
of over $10
motive, trai

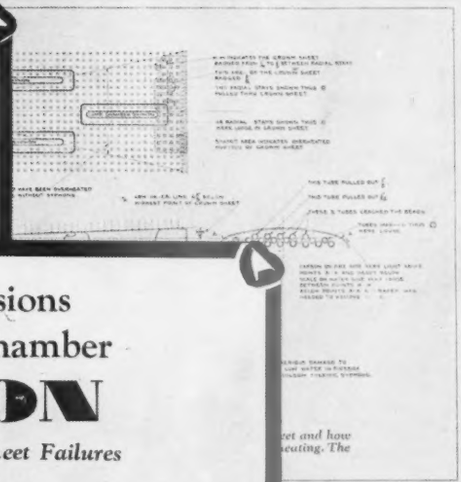
LOCOMO
New York

The **FOURTH** Demonstration

of **SAFETY** With

The Combustion Chamber

SYPHON



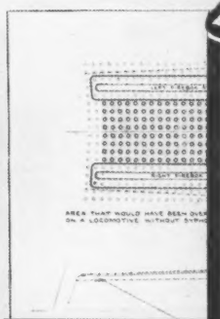
On **FIVE** Occasions

The Combustion Chamber

SYPHON

Has Prevented Serious Crown Sheet Failures

24-INCH HAZARD PROTECTED



Reproduced from the Railway Age April 14, 1934

---

locomotive
ter recently

v water on
f which we
been as low
ts. Syphons

MPANY
MONTREAL

FOR COMPLETE SAFETY

The Combustion Chamber

Must Have Its Own

SYPHON PROTECTION

LOCOMOTIVE FIREBOX COMPANY

NEW YORK CHICAGO MONTREAL

LOCOM
NEW YORK

The crown sheet of this large locomotive carrying 250 pounds boiler pressure was fully protected with the upper twenty-four inches of the firebox above the water line. There have been 38 reported cases of low water, all proving

SYPHON SAFETY

IS REAL SAFETY

•

LOCOMOTIVE FIREBOX COMPANY

NEW YORK CHICAGO MONTREAL

Reproduced from the Railway Age May 19, 1934

Little Laboratories





— an important adjunct in producing the large savings of complete scientific water control

Working in conjunction with Dearborn engineers one railway system has effected savings of over $200,000.00 annually in boiler washing and related expense by a system of blowing down on the road based on hydrometer tests made after each trip. Water changes were reduced from 43,917 in 1930 to 93 in 1933.

Little laboratories were established at terminals and concentration tests made at the end of each locomotive run. By this method the water treatment provided by the Dearborn Chemical Company for internal application is given ample opportunity to do its work and to build up to the proper concentration to prevent scaling and corrosion.

(See the article by E. VonBergen in the April 7, 1934 issue of Railway Age.)

The experience and scientific facilities of the Dearborn Chemical Company are at your disposal in producing comparable savings in locomotive operation.

DEARBORN CHEMICAL COMPANY

310 S. MICHIGAN AVENUE, CHICAGO — 205 E. 42nd STREET, NEW YORK

CANADIAN OFFICE and FACTORY: TORONTO



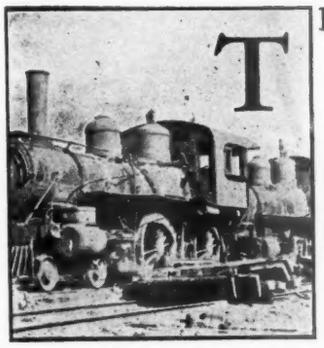
A SECTION OF THE DEARBORN LABORATORIES

Dearborn

TRADE MARK REGISTERED

A HOUSE OF CHEMICAL ENGINEERS

RELICS



THE obsolete locomotive in dead storage represents inactive capital upon which interest and depreciation wastefully continue to accrue. Its only value is as scrap, and its greatest value is as scrap cut to charging box size and sorted to classification.

If you have any such relics—your scrapping gang with their oxy-acetylene blowpipes can quickly cut them into marketable metal. The Oxweld Railroad Service Company has developed and perfected oxy-acetylene cutting procedures now available for Oxweld contract roads, which assure a high recovery from the scrapping operation.

If planning the replacement of obsolete equipment, contract roads should apply for this information and instruction now. A majority of the Class I railroads appreciate this service and have been contract customers of The Oxweld Railroad Service Company for many years.

Users of products and processes developed by Units of Union Carbide and Carbon Corporation benefit from a most unique coordination of scientific research with manufacturing, sales and service facilities. You are cordially invited to visit this summer the numerous exhibits sponsored by the Corporation in both the Basic and Applied Science sections in the Hall of Science at Chicago's 1934 A Century of Progress Exposition.

OXWELD RAILROAD SERVICE

THE OXWELD RAILROAD SERVICE COMPANY

Unit of Union Carbide and Carbon Corporation

NEW YORK: Carbide and Carbon Bldg. UCC CHICAGO: Carbide and Carbon Bldg.

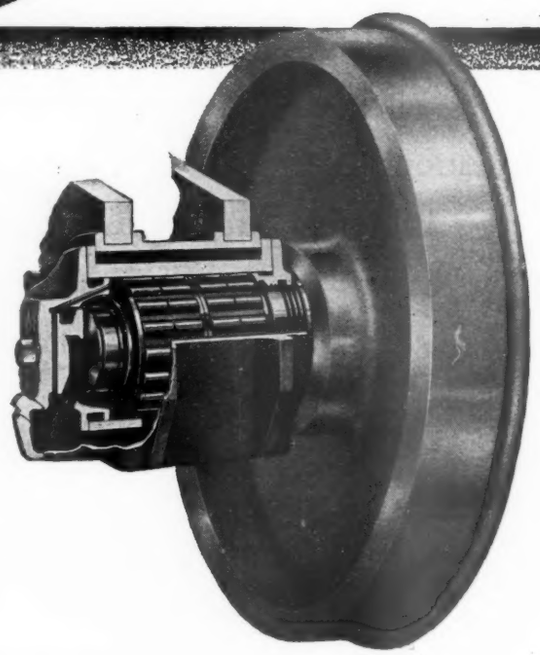
NRA

ECONOMICAL *Revolutions* FOR THE RAILROADS!

Every revolution of every wheel that runs on Fafnirs contributes a saving. For 10 years on leading railroads Fafnir Roller Journal Bearings have proven that they reduce starting torque 85% to 90%, that they cut maintenance by ⅔, that they absorb all loads — shock, thrust, and vibration — and continue to do so indefinitely.

Modernization of existing passenger cars through the use of Fafnirs is a simple job — and inexpensive. Any capable workman can do the job quickly. The trucks require no change whatsoever and standard axles are used.

You can banish hot boxes and reduce inspection to a checking of the oil level every 30 days. You can make every revolution economical and provide increased travelling comfort — with Fafnir Roller Journal Bearings. We can prove our claims. Give us the opportunity. The FAFNIR BEARING CO., *New Britain, Connecticut.*

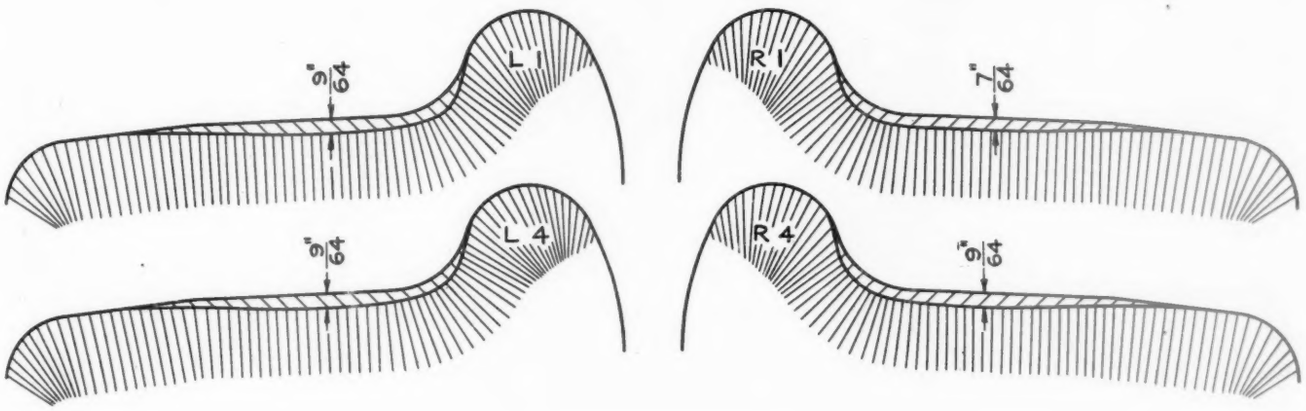


The Fafnir Roller Journal Bearing combines ample capacity with positive lubrication at all speeds and under all temperatures.

Safeguarding Quality

FAFNIR *Roller Journal* BEARINGS

Actual Service Test
TELLS THE STORY



The above contours show actual wear of flange and tread of 850# GRIFFIN SINGLE PLATE CHILLED TREAD WHEELS under 70-ton capacity coal cars after FOUR YEARS and EIGHT MONTHS of constant service.

Of the 3,400 Griffin wheels placed under the cars when built 98% are still in service—only 2% having been removed for all causes.

That the GRIFFIN CHILLED TREAD Wheel is most suitable and economical for service under 70-ton capacity cars has been definitely proven.

THE FOOD SUPPLY OF THE NATION IS CARRIED ON CHILLED TREAD WHEELS

GRIFFIN WHEEL COMPANY

410 NORTH MICHIGAN AVENUE CHICAGO, ILLINOIS

Plants

Chicago	Boston	Cincinnati	Kansas City	Denver	Los Angeles
Detroit	Cleveland	St. Paul	Council Bluffs	Salt Lake City	Tacoma



This might well be the J-M Sales Engineer in his working clothes

CLIMBING into an oil-burner fire box to check up on the refractory cement setting — tramping over a roundhouse roof with a roofing inspector—donning a pair of borrowed overalls while a boiler feed pump is packed under his supervision—it's all in the day's work for the Johns-Manville Sales Engineer. He knows the railroad's needs from a railroad point of view. More than likely, he held his first job in a railroad shop.

On the first-hand knowledge of men like these, Johns-Manville has based its development of the many products we offer to the railroads.

The widely adopted Johns-Manville Plan of Packing Standardization . . . the successful use of Johns-Manville Insulation in steel-car construction . . . the important strides in refrigerator-car insulation . . . are typical results of our constant effort to coordinate the products of our mines and factories to meet the changing needs of Transportation.

Johns-Manville Waterproof Refrigerator Car Floors and the application of Acoustical Treatment for quieting dining cars and de luxe equipment have been developed in close cooperation with the railroads.

• • •

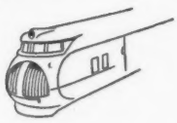
In 1934, as in the past 50 years, Johns-Manville resources and manufacturing facilities stand ready to serve the railroads—from coast to coast—at a fair price, promptly and efficiently. Johns-Manville, 22 E. 40th Street, New York City.

JM PRODUCTS **Johns-Manville** NRA WE DO OUR PART

SERVICE TO TRANSPORTATION

NEW YORK · CLEVELAND · CHICAGO · ST. LOUIS · SAN FRANCISCO

Recondition... WITH PYLE-NATIONAL STANDARDS OF QUALITY

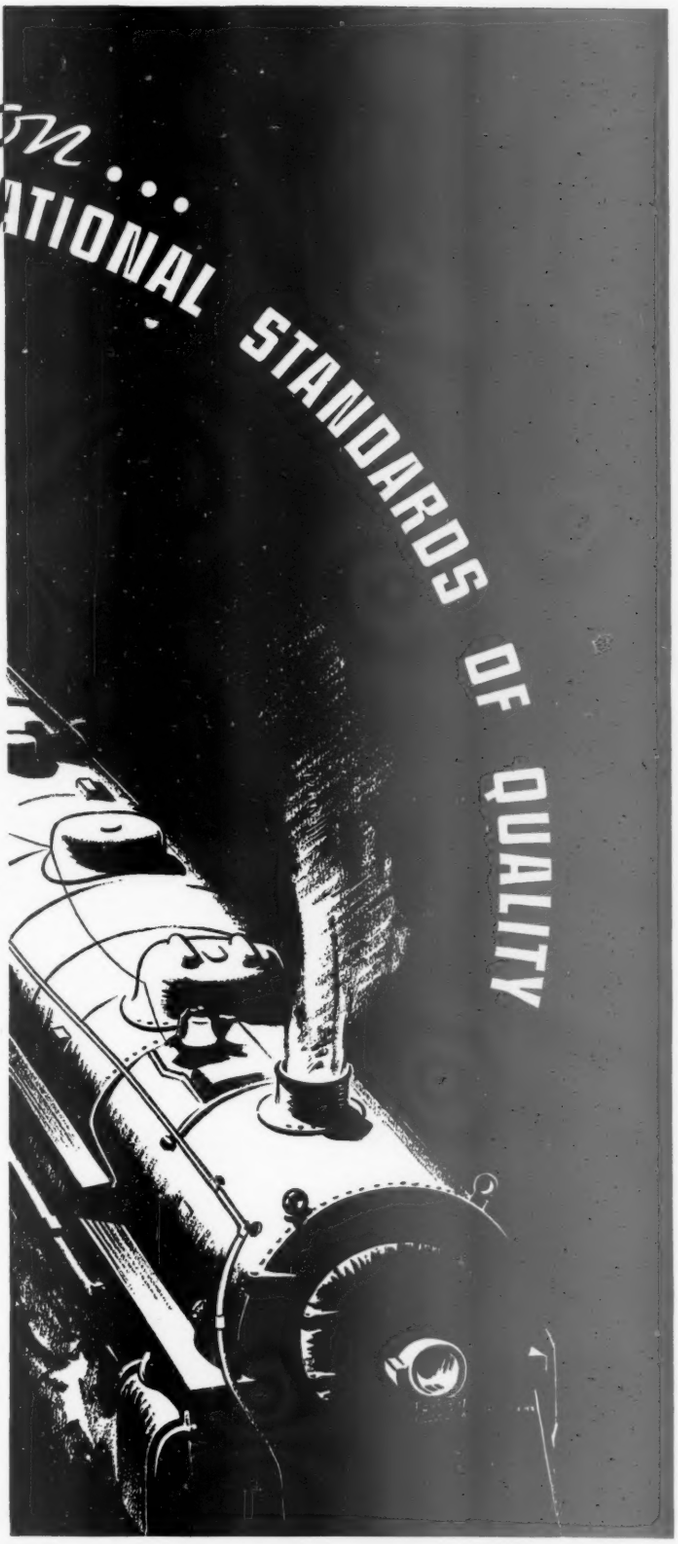


Railroads engaged in restoring present equipment or the acquisition of new types will find Pyle-National railway electrical equipment specifically adapted to the most modern operating requirements, and backed by the high standards of quality manufacture that have been maintained throughout 38 years of service to railroads.

Present economy and an assurance of satisfactory service for the future are contained in this combination of many years of experience and consistent engineering advancement in tune with the changing requirements of service.

THE PYLE-NATIONAL COMPANY
1334-58 N. Kostner Ave., Chicago, Illinois
Electro-Chemical Engineering Corporation
Subsidiary
Grand Central Terminal Building, New York • Hobart Building, San Francisco • Builders Exchange Building, St. Paul • Boatmen's Bank Building, St. Louis. Canadian Agents, The Holden Co., Ltd., Montreal, Toronto, Winnipeg, Vancouver. Export Department, International Railway Supply Company, 30 Church Street, New York.





PYLE-NATIONAL

Railway Electrical Equipment

Headlights • Turbo-Generators • Train Lighting Systems • Floodlights for All Purposes • Locomotive Electrical Fittings • Wiring Appliances • Gas-Electric Sets • Signal Foam Meter and Automatic Blow-Off Equipment • Gunderson Process Corrosion Prevention.



. . . 26 Years of Specialized Research

When the Cardwell Friction Draft Gear was introduced 26 years ago, it had a capacity far beyond the requirements of that day.

Research and test studies started at that time and carried on continuously, have greatly improved this draft gear and enabled our Engineers to make use of the great advancement which has taken place in knowledge of metals and alloys.

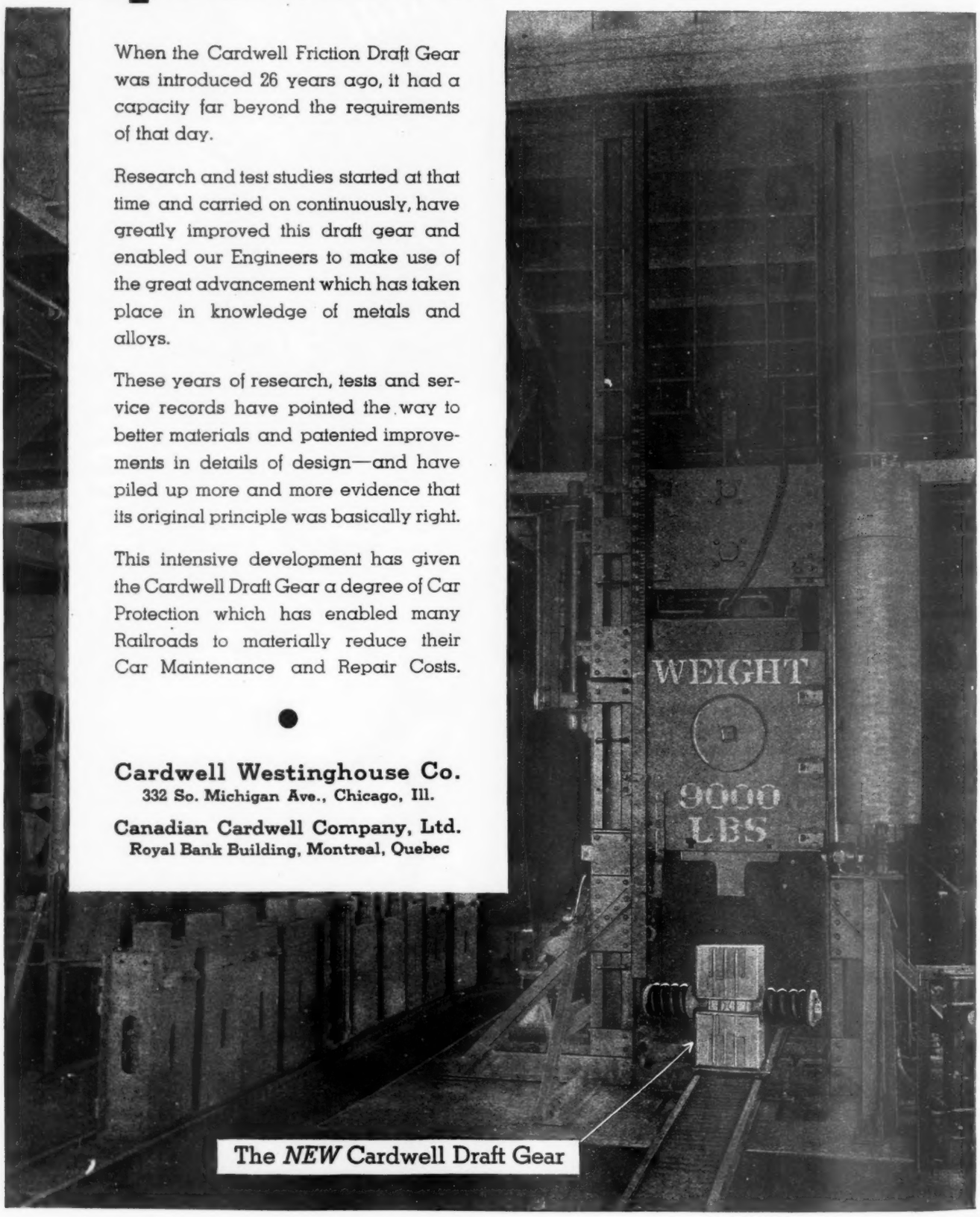
These years of research, tests and service records have pointed the way to better materials and patented improvements in details of design—and have piled up more and more evidence that its original principle was basically right.

This intensive development has given the Cardwell Draft Gear a degree of Car Protection which has enabled many Railroads to materially reduce their Car Maintenance and Repair Costs.

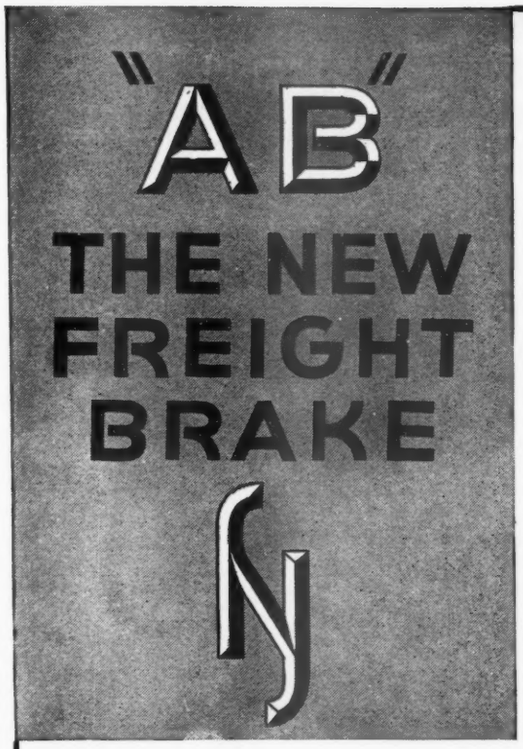
●

Cardwell Westinghouse Co.
332 So. Michigan Ave., Chicago, Ill.

Canadian Cardwell Company, Ltd.
Royal Bank Building, Montreal, Quebec



The *NEW* Cardwell Draft Gear



Meet
Modern Schedules With
REDUCED TRAIN COSTS
Through the Use of . . .

"AB" FREIGHT BRAKES

FLASHES of speed are very costly, and seldom overcome the handicap of numerous stops—it's the sustained forward motion at schedule speed that really counts. Excessively high top speeds to meet schedules should be avoided.

"AB" freight brakes supply a singular paradox—they not only insure reliable stops from high speed, within required stopping distances—but their dependable efficiency also serves to keep trains in motion when they should be moving—through eliminating stops and delays due to the use of ineffective or obsolete equipment.

Such performance maintains schedules and cuts train costs. "AB" brakes operate perfectly in combination with the "K" type, being interchangeable, and a few "AB" brakes properly located in a train otherwise equipped with the "K" type, will definitely improve the effectiveness of the whole system.

On request, mentioning this particular advertisement, we will gladly submit data on the economical performance of "AB" brakes

•

The NEW YORK AIR BRAKE Company

420 LEXINGTON AVE., NEW YORK CITY
PLANT — WATERTOWN, NEW YORK

IN 1882 THE C.B. AND Q. WAS FINED $5.00 *for killing a Cow on Sunday*

The price of rails is a much less important consideration in railway building than the financial condition of the manufacturing industries.

THE Sunday observance law has been tested in Iowa. A cow of irreligious habits, while wandering about on the Sabbath, walked upon the track of the Chicago, Burlington & Quincy road in front of a train, and perished in her sins. The owner very illogically undertook to punish the railway company for his cow's Sabbath breaking by bringing suit for damages, which he endeavored to increase by citing a statute which provides that any person found performing any labor on the Sabbath day, the work of charity and necessity excepted, shall upon conviction be fined not exceeding $5. The lower court found for the plaintiff, but the supreme court now reverses this decision, declaring that while it is true that the cow would not have been killed if the train had not been running on Sunday, it is also true that she would not have been killed if she had not got on the track, so the proximate cause of the injury was not the operation of the train but the result of an accident, for which the company was not responsible, and no other liability attaches to the company than is imposed by the statute—$5 fine.



Reprinted from RAILWAY AGE
December 28, 1882

Back in 1882, the railroads were still young. They were frequently imposed upon and the law took some queer turns in dealing with them.

But even in those early days there were laid foundations for good railroading that have provided sound ballast for present day operation.

It was in 1882, in fact, when the first railroad refrigerator car insulation was sold by the founders of the American Hair & Felt Co. and Dry-Zero Corporation. Since that time more than 50 years ago, we have supplied almost all the insulation for American and Canadian railroads — more than 87% of the total.

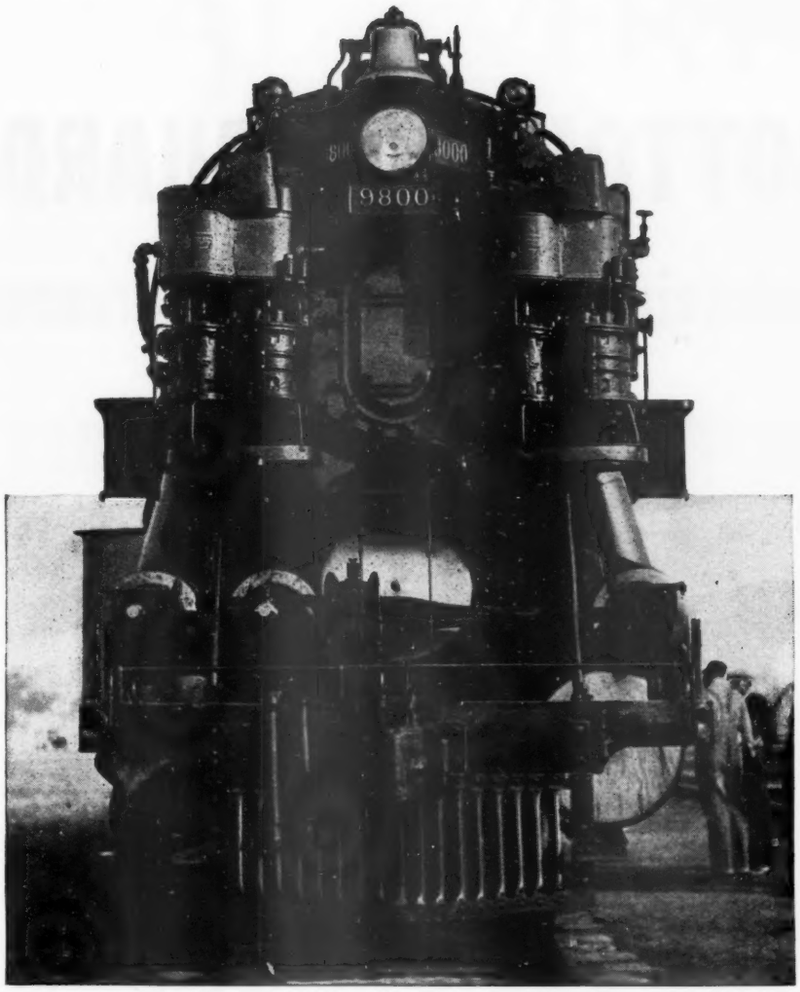
It is this long period of service and the proved dependability of our products, coupled with advanced research work in the solution of today's problems, that have earned the universal respect of railroad officials. Our laboratory, our engineering staff and our production facilities are at your disposal.

HAIRINSUL	**Standard refrigerator car insulation**
DRY-ZERO	**The most efficient and lightest weight low temperature insulation known—standard for low temperature cars**
SALAMANDER	**For over 30 years the standard insulation for passenger cars**
CARINSUL	**Made especially for insulating the letter board of passenger cars**
OZITE STANDARD HAIR FELT	**Made by the genuine original platen or felted process and universally recognized as the highest standard of felted insulation.**

AMERICAN HAIR & FELT COMPANY—DRY-ZERO CORPORATION

(Railroad Division)

Merchandise Mart **Chicago**



ALLOY STEEL ASSURES GREATER STRENGTH . . . . . REDUCED WEIGHT

MORE speed with safety is the demand being put upon modern locomotive performance—and as a result industry is turning definitely to the use of alloy steel for the lighter and stronger equipment necessary.

Needless weight in vital parts not only invites performance failure but puts a demand upon the road bed and bridges that is entirely out of keeping with present day economy practices and safety in operation.

As a result of new engineering principles now applied to construction, the investment in alloy steel parts automatically lifts the locomotive out of competition with others built of ordinary steel and iron parts.

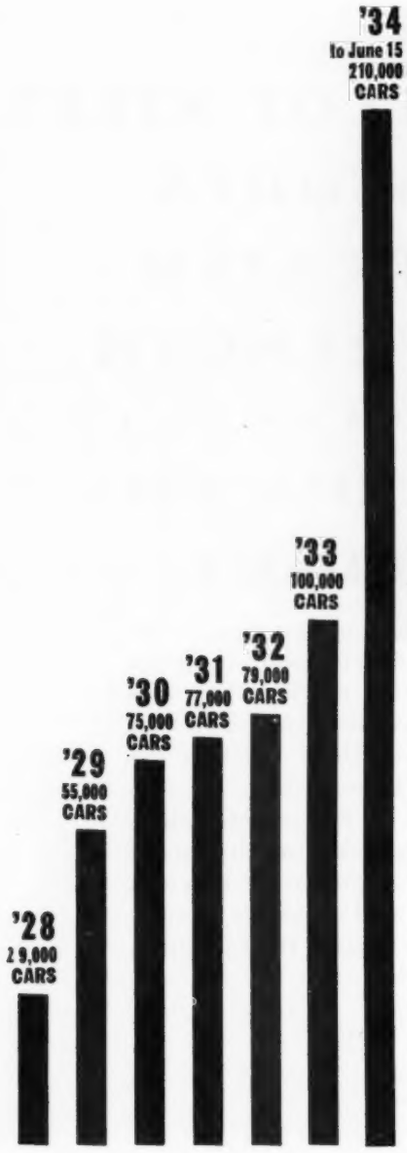
The experience of Electro Metallurgical Engineers gained through years of research and development of Electromet Ferro Alloys and metals is at your disposal. You are invited to draw upon this resource freely.

ELECTRO METALLURGICAL SALES CORP.
Unit of Union Carbide UCC *and Carbon Corporation*
Carbide and Carbon Building, 30 East 42nd Street
New York, N. Y.

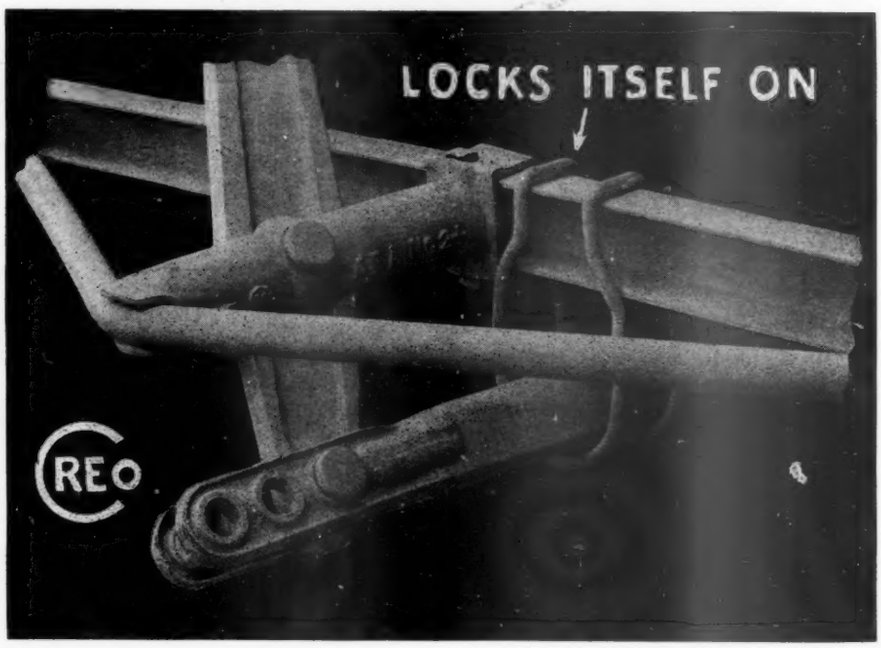
Electromet
Ferro-Alloys & Metals

CRECO BOTTOM ROD GUARD

. . *always* maintains the proper clearance



Application of Creco Bottom Rod Guards has increased steadily . . . 210,000 cars in the service of 70 roads and car lines are now equipped.



The Creco Guard is locked on and *moves with the brake beam* . . . it always maintains the proper bottom rod clearance.

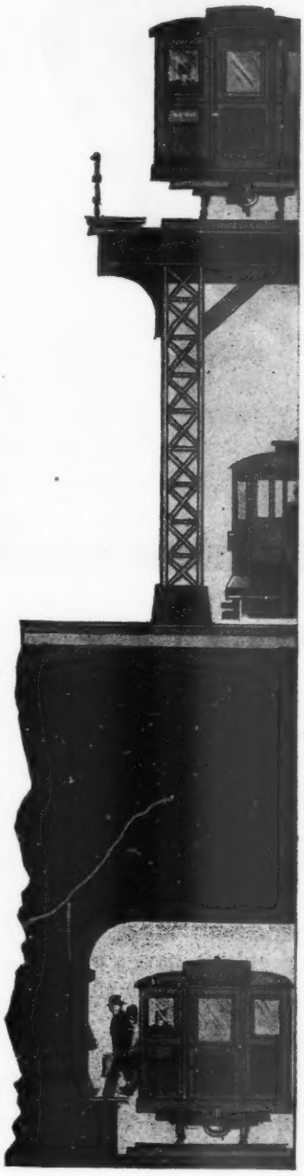
Slipped over the brake beam compression member and easily driven down. The offsets in the spring steel clamp it in place . . . *no riveting or welding* is needed.

Applicable interchangeably to U-section, channel section and V-section beams.

CHICAGO RAILWAY EQUIPMENT COMPANY

McCORMICK BUILDING . . . . . CHICAGO, ILLINOIS

AT EVERY LEVEL



At every level of operation — elevated lines, surface cars or subways — there you will find "Standard" Wrought Steel Wheels. NEARLY two billion wheel miles, carrying the Interborough Rapid Transit Company's 1,261,904,518 passengers or on many other heavy-traffic lines, have proved that "Standard" Wheels *do* give more wear with longer intervals between replacement. At whatever level you operate there is only one level of economy — the lowest cost per wheel mile represented by the cost of a "Standard" Wheel.



STANDARD STEEL WORKS COMPANY

SUBSIDIARY OF THE BALDWIN LOCOMOTIVE WORKS

GENERAL OFFICES & WORKS: BURNHAM, PA.

NEW YORK PHILADELPHIA CHICAGO ST. LOUIS PORTLAND SAN FRANCISCO AKRON



SILICON-VANADIUM-

A Tough Steel That Can Take It !

From a height of 35 feet, a 2240 pound weight was dropped on the side of a Silicon-Vanadium helical spring, 10⅛" in height, 8" O.D., made from a 1⅜" bar, with a tensile strength of more than 215,000 pounds. How well the tough Silicon-Vanadium spring withstood the terrific impact is shown by the unretouched photograph.

Years of railroad service have demonstrated that Silicon-Vanadium Steel, with its combination of high elastic limit and great toughness, is the ideal material for coil springs.

Metallurgists of the Vanadium Corporation of America, with a background of years of experience in the study of railroad problems, have a great deal of interesting data on the performance of Silicon-Vanadium Steel in equalizer coil springs and Chrome-Vanadium Steel in leaf springs on American railroads. Their assistance is yours for the asking — they may be able to help you reduce spring costs.

VANCORAM

FERRO-ALLOYS

of vanadium, silicon, chromium, titanium, and silico-manganese, produced by the Vanadium Corporation of America, are used by steel makers in the production of high-quality steels.

VANADIUM CORPORATION OF AMERICA

120 BROADWAY, NEW YORK, N. Y.

CHICAGO PITTSBURGH *Bridgeville, Pa.* DETROIT

Plants at Bridgeville, Pa., and Niagara Falls, N. Y.
Research and Development Laboratories at Bridgeville, Pa.

VANADIUM STEELS

for strength, toughness and durability



For the Missouri Pacific, too,

Lacquer has Proved its Superiority

"It's 70° in the 'Sunshine' when it's 100° in the shade," says the Missouri Pacific of their famous air-conditioned train, the Sunshine Special. * * * Fine passenger equipment such as this deserves a fine finish, a finish such as the Missouri Pacific has learned can best be obtained with lacquer. * * * Lacquer has become "standard equipment" with the Missouri Pacific and is used on the exterior of all their steel passenger equipment and on tenders and locomotives.

While the initial cost of lacquer is somewhat higher, its better appearance, its easier cleanability, and especially its longer life even under severest operating conditions, have proved to the Missouri Pacific that lacquer is the most economical finish per mile, or per year, of service. Conservatively speaking, the Missouri Pacific has found that the life of a lacquer finish is at least twice that of coating materials formerly used. * * * Again lacquer demonstrates that it ranks first for value in railway maintenance.

NOTE THESE 12 POINTS OF SUPERIORITY

1 Lacquer dries rapidly—in minutes, not hours.
2 Lacquer dries hard—and remains so.
3 Lacquer is print-proof.
4 Lacquer is stable in the drum or can; no seeds; no granules; no "skinning."
5 Lacquer produces a clean surface, free from nibs, grit, and dirt.
6 Lacquer does not water-spot—it is washable.
7 Lacquer cleans more easily—it is alkali as well as acid-proof.
8 Lacquer is stain-proof.
9 Lacquer will not wrinkle—all coats unite into one uniform film.
10 Lacquer "touches-up" perfectly.
11 Lacquers can be "tailor-made" to fit many special uses.
12 Lacquer is longer-lived and retains its beauty.

COMMERCIAL SOLVENTS CORPORATION
230 PARK AVENUE · NEW YORK, N. Y.
Plants at TERRE HAUTE, INDIANA and PEORIA, ILLINOIS

While Commercial Solvents Corporation does not manufacture lacquer, it supplies the coatings industry with important materials—Butanol and Butyl Acetate C. S. C.—which are determining factors in lacquer quality.

BUTANOL *Assures* LACQUER QUALITY

DURYEA CUSHION UNDERFRAME



Makes lightweight car construction practicable through low end forces and maximum cushioning against impacts in service

DURYEA LIGHTWEIGHT HOPPER

Rail Load	169,000 lbs.
Light Weight	31,200 lbs.
Revenue Load	137,800 lbs.
Ratio of Pay Load to Gross Load	81½%

DURYEA UNDERFRAME turns DEAD LOAD into PAY LOAD.

DURYEA UNDERFRAME reduces END FORCE ONE HALF.

DURYEA UNDERFRAME increases SHOCK PROTECTION FOUR TIMES for lading and cars in switching and train service.

•

O. C. DURYEA CORPORATION

30 EAST 42nd STREET NEW YORK, N. Y.

Cars of Duryea lightweight construction now on display at Baltimore and Ohio Exhibit at Century of Progress.

OIL-ELECTRIC POWER



The Modern Power

THERE'S no mystery surrounding the oil-electric locomotive and rail car. They are easy to operate — easy to maintain — and insure big operating economies. The internal combustion engine is one of the most efficient forms of prime movers available. The electric drive is efficient and the most easily controlled form of power transmission. The combination of the two offers far-reaching possibilities in railway transportation.

The I-R oil engines embody the following characteristics which have made them the outstanding oil engine to meet railway requirements, and why 76 per cent of the oil-electrics in the United States are powered with I-R engines.

Reliability
Good Balance
Relatively High Speed and Low Weight
Accessibility with Low Maintenance
Absence of Noise and Smoke
Reasonable Fuel Economy
Reasonable Lubricating Oil Economy
Reasonable First Cost

For the past 15 months, there has been an I-R 600-hp. oil-electric rail car in revenue service on 10 different railroads handling one to five trailers under all kinds of branch line, local, and express service. The performance data demonstrated the Diesel's clean-cut superiority over a gasoline unit of similar capacity — and proved that the I-R oil-electric rail car is one of the most economical and dependable forms of passenger motive power.

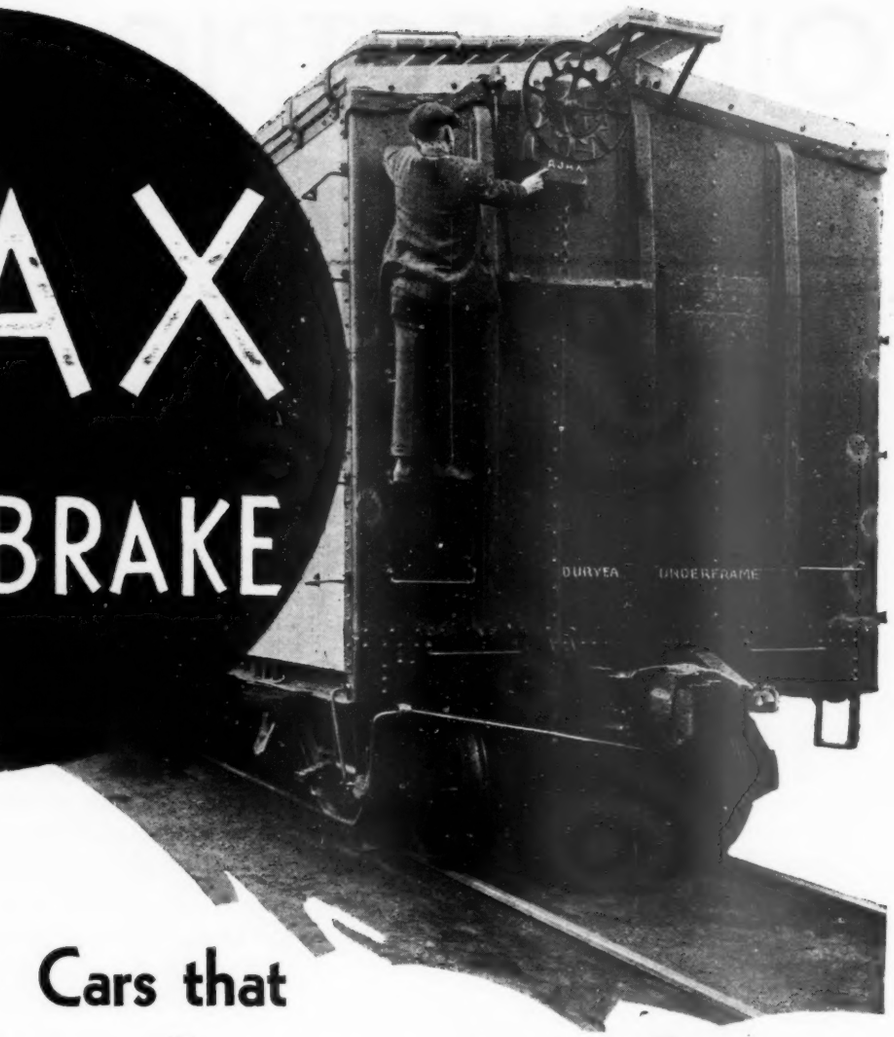


Birmingham Boston Buffalo Butte Chicago Cleveland Dallas
Detroit Denver Duluth El Paso Honolulu Knoxville Los Angeles

Ingersoll-Rand
11 BROADWAY, NEW YORK

Manila Newark New Orleans Philadelphia Picher Pittsburgh San Francisco
Salt Lake City Scranton Seattle St. Louis St. Paul Tulsa Washington

AJAX HAND-BRAKE



Will Stop Thousands of Cars that Are Now Being Constructed or Repaired



View showing repair yards of one large eastern road where 1000 cars are being equipped with the AJAX Hand Brake.

BOX cars — tank cars — gondolas — flats — cabooses — refrigerators — all types of freight cars are being equipped with the AJAX Hand Brake.

Over 17,000 of these safe and efficient Hand Brakes have been ordered since January 1, 1934 by the railroads for new cars and those which are undergoing general repairs.

Safety, speed and power are the outstanding advantages of the AJAX Hand Brake. It can be released gradually or instantaneously with one hand. Both feet and left hand are always free to retain safe position on the car.

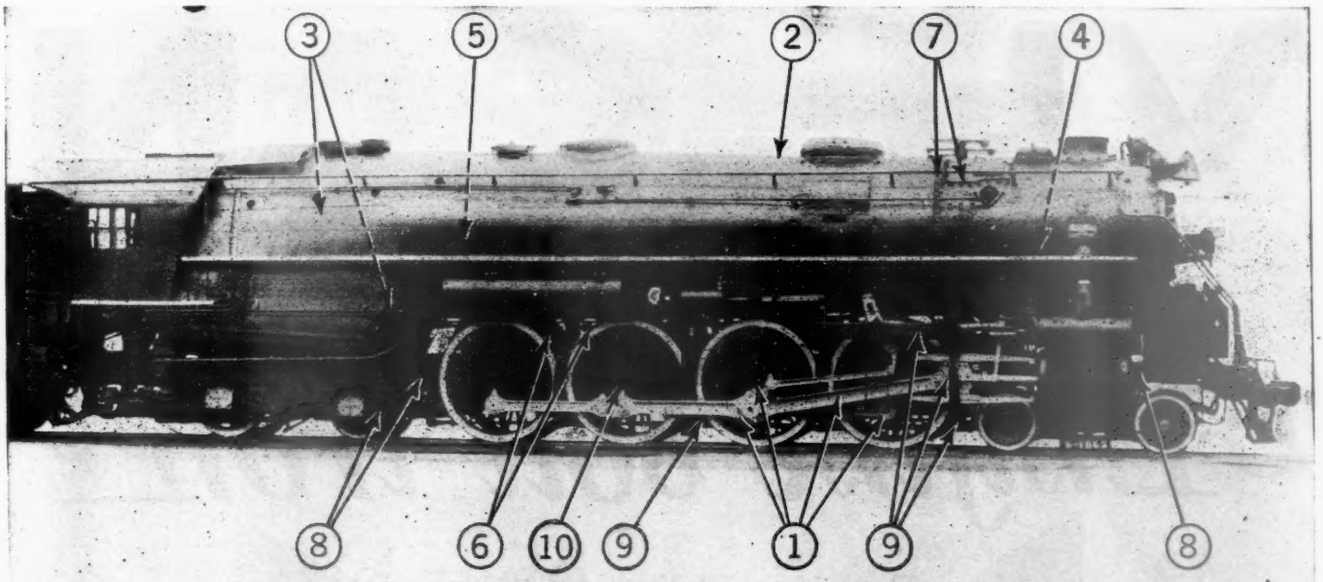
AJAX engineers are always ready to assist in the preparation of hand brake applications for any type of car.

Over 160,000 cars now equipped.

AJAX HAND BRAKE COMPANY

Chicago — New York

LONG LOCOMOTIVE LIFE...LOW MAINTENANCE COST



—Applications of nickel alloy steels in locomotive construction.

PARTS	1. Forgings, (Axles, Rods, Pins, etc.)	2. Boiler Shell Plate	3. Firebox Plate	4. Boiler Tubes	5. Staybolts	6. Engine Bolts and Spring Rigging	7. Rivets	8. Frame Castings	9. Miscellaneous Castings (Crossheads, Wheel Centers, etc.)	10. Roller Bearings
STEELS	Low C, 2¾% Ni	2% Ni, 0.20% C, Max.	2% Ni, 0.15% C, Max.	2% Ni, 0.10% C	2% Ni, 0.05% C, Max.	S.A.E.-2115	S.A.E.-2115	Low C, 2% Ni; Low C, Ni-V	Medium C 2% Ni	S.A.E. 4620; "Krupp" (4.5% Ni, 1.5% Cr)
INCO* RAILROAD SPEC. NO.	2	3	3	10	7	5A	9	6	4	...

* INCO=International Nickel Company.

...WITH THESE PARTS OF NICKEL ALLOY STEEL

THE modern high-speed, heavy-duty locomotive requires steels possessing higher properties than can be obtained with the carbon steels.

Demands that must be met are high resistance to shock and fatigue—toughness at low temperatures, for operation in cold climates—freedom from embrittlement resulting from cold working or in service—resistance to corrosion, and to corrosion fatigue—strength at elevated temperatures.

Not every steel meets this formidable list of requirements but one group that does, are the steels containing Nickel.

The chart above shows a number of locomotive applications where Nickel Steels have definitely demonstrated their suitability. The Nickel Steel compositions indicated, are typical of those which have been most generally used in Canada and the United States.

FORGINGS

For locomotive forgings, such as piston rods, side rods, main rods, crank pins, and driving axles, low carbon 2.50/3.00% Nickel Steels have demonstrated their superiority to medium carbon unalloyed steels. The toughness and higher elastic properties of the low carbon Nickel Steels provide increased resistance to impact and overstress.

BOILER STEELS

Boiler plates containing Nickel have decided advantages over low carbon unalloyed steel. In addition to possessing greater ductility, strength and resistance to shock, Nickel Steel boiler plates are stronger at elevated temperatures, resist embrittlement due to "cold working", resist grain growth, and under some conditions show better resistance to corrosion.

The high strength of Nickel Steel boiler tubes permits thinner sections to be used, thus saving weight.

Firebox plates must resist stresses and corrosion which vary over wide limits. The only reliable guide to the merits of different materials is their performance in actual service. Since 1925 Nickel Steel plates have been used in the fireboxes of more than 200 locomotives. In 90 per cent of these installations they have given complete satisfaction.

BOLTS AND RIVETS

Low carbon Nickel Steels have for years provided the dependability, strength, resistance to fatigue, and toughness required for engine bolt service. The yield point of Nickel Steel hot rolled bars is approximately twice that of ordinary wrought iron.

Rivets of Nickel Steel (S. A. E. 2115) have all of the easy handling properties found in carbon steels, but possess a shearing strength about 45% higher.

STEEL CASTINGS

Nickel additions also impart superior properties to low carbon Nickel Steel castings. Locomotive frames, wheel centers, crossheads, etc., when made of Nickel Steels offer improved strength, combined with ductility and resistance to shock and fatigue.

Because of their superior ability to withstand high unit loads combined with resistance to shock and fatigue, Nickel Alloy Steels are also widely used in railroad roller bearings.

Over a period of years we have compiled extensive data on applications of nickel alloys. This information, and the experience of our technical staff and research laboratories, are always at the service of the transportation industries.

THE INTERNATIONAL NICKEL COMPANY, INC.
67 WALL STREET, NEW YORK, N. Y.
Miners, refiners and rollers of Nickel...Sole producers of Monel Metal

VULCAN XX

Engine bolt iron



There is no substitute for the wrought iron dependability of VULCAN XX ENGINE BOLT IRON. It gives to hard-working locomotives the toughest sinews of strength.

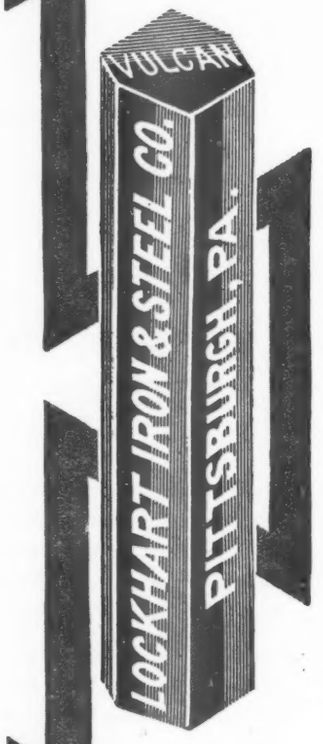
For VULCAN XX ENGINE BOLT IRON has the characteristic built-up structure of wrought iron, composed of layer on layer of beaten iron, welded into a solid homogeneous unit of super-strength.

For this reason VULCAN XX ENGINE BOLTS can't shear in the most severe service as steel bolts do. Every layer of iron acts as a perfect barrier to progressive segregation.

That's why so many railroads use VULCAN XX ENGINE BOLT IRON. They last for years.

VULCAN BLOOM STAYBOLT IRON
VULCAN IRON FORGING BILLETS

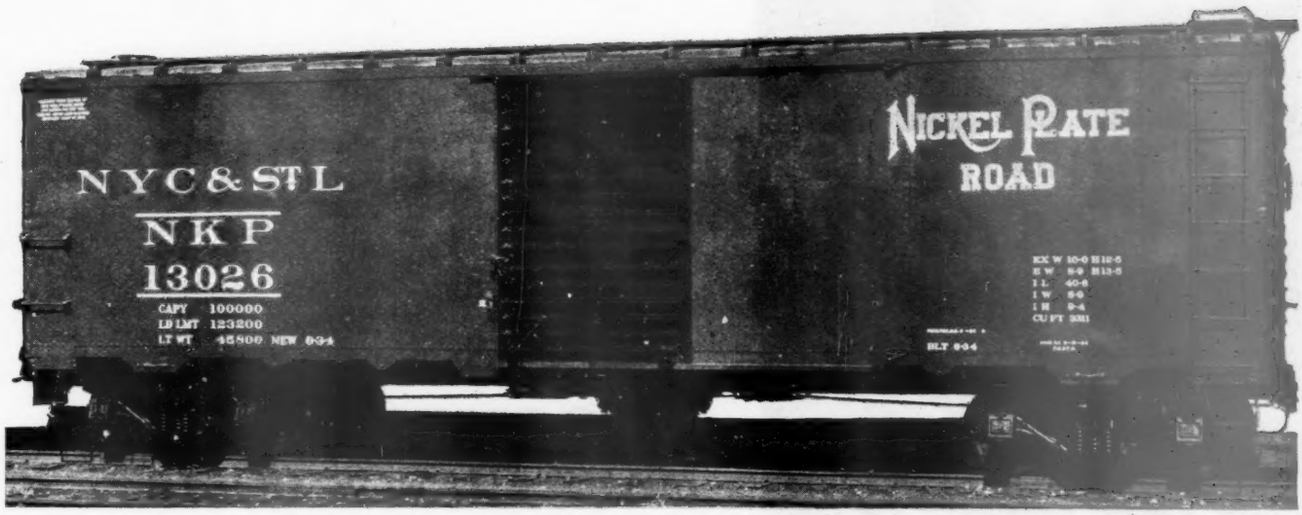
Lockhart Iron & Steel Company
Pittsburgh Penna.



Direct Mill Representatives:
Blatchford Corporation
Railway Exchange,
Chicago, Ill.

LOCKHART

PITTSBURGH



Equipped with
YOUNGSTOWN *Steel Doors and* CAMEL *Roller Door Fixtures*

The bottom edge of the door rests upon the track in any position except when the door is being manually opened or closed.

The weight of the door is carried by the rollers only when it is being opened or closed, which eliminates wear in operating parts and protects the front stop and back stops.

Wedge action of lock keeps door tight.

Four-edge weather and cinder protection provided.

Hangers are equipped with grease packed roller bearings to insure easy operation of the door.

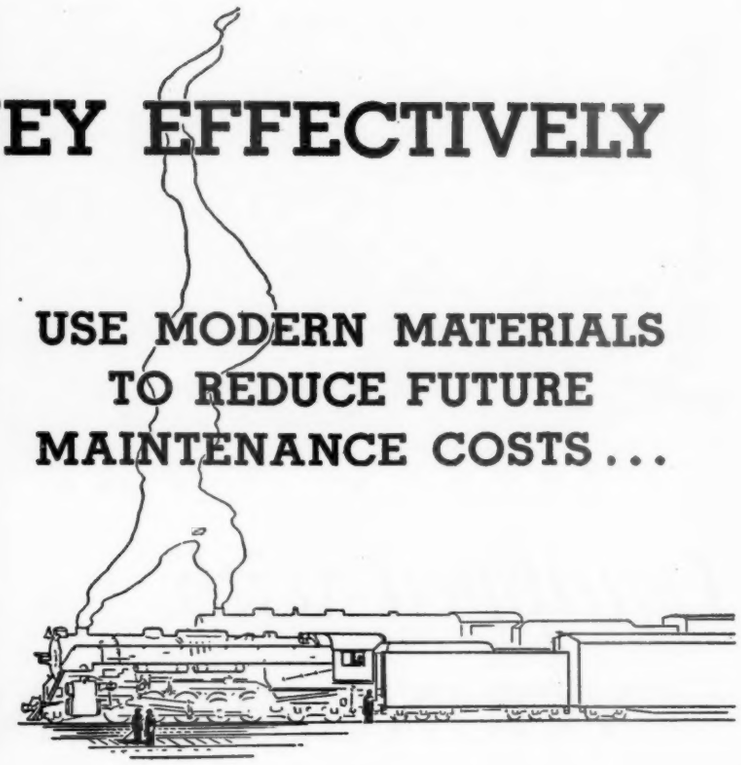
CAMEL SALES COMPANY

332 SO. MICHIGAN AVENUE

CHICAGO ILLINOIS

SPEND REPAIR MONEY EFFECTIVELY





USE MODERN MATERIALS TO REDUCE FUTURE MAINTENANCE COSTS . . .

With a billion dollars per year being spent on equipment maintenance, there are large economies possible thru the selection of materials that will last longer. » » » To meet the increased stresses imposed by modern railroading, Republic has developed many alloy irons and steels with improved properties that will give longer service life. » » » Replace leaky bolts with modern Republic alloy steel staybolts that have greater fatigue resistance to meet today's conditions. » » » Pins, rods and axles should be made of modern Agathon Alloy Steels for greater strength and freedom from cold brittleness. Alloy firebox sheets will give longer service thru improved resistance to fire-cracking and corrosion. » » » Agathon Nickel Iron for case-hardened parts has a tough core while taking a hard surface. It will reduce wear on bushings. » » » These are only a few of the metallurgical developments of Republic Steel Corporation that mean longer service and lower future maintenance. » » » Consult with Republic on problems involving materials. » » » » »

Toncan Iron Boiler Tubes, Pipe, Plates, Culverts, Rivets, Tender Plates and Firebox Sheets • Sheets and Strip for special railroad purposes • Agathon Alloy Steels for Locomotive Parts • Agathon Engine Bolt Steel • Agathon Iron for pins and bushings • Agathon Staybolt Iron • Climax Steel Staybolts • Upson Bolts and Nuts • Track Material, Maney Guard Rail Assemblies • Enduro Stainless Steel for dining car equipment, for refrigeration cars and for firebox sheets • Agathon Nickel Forging Steel.

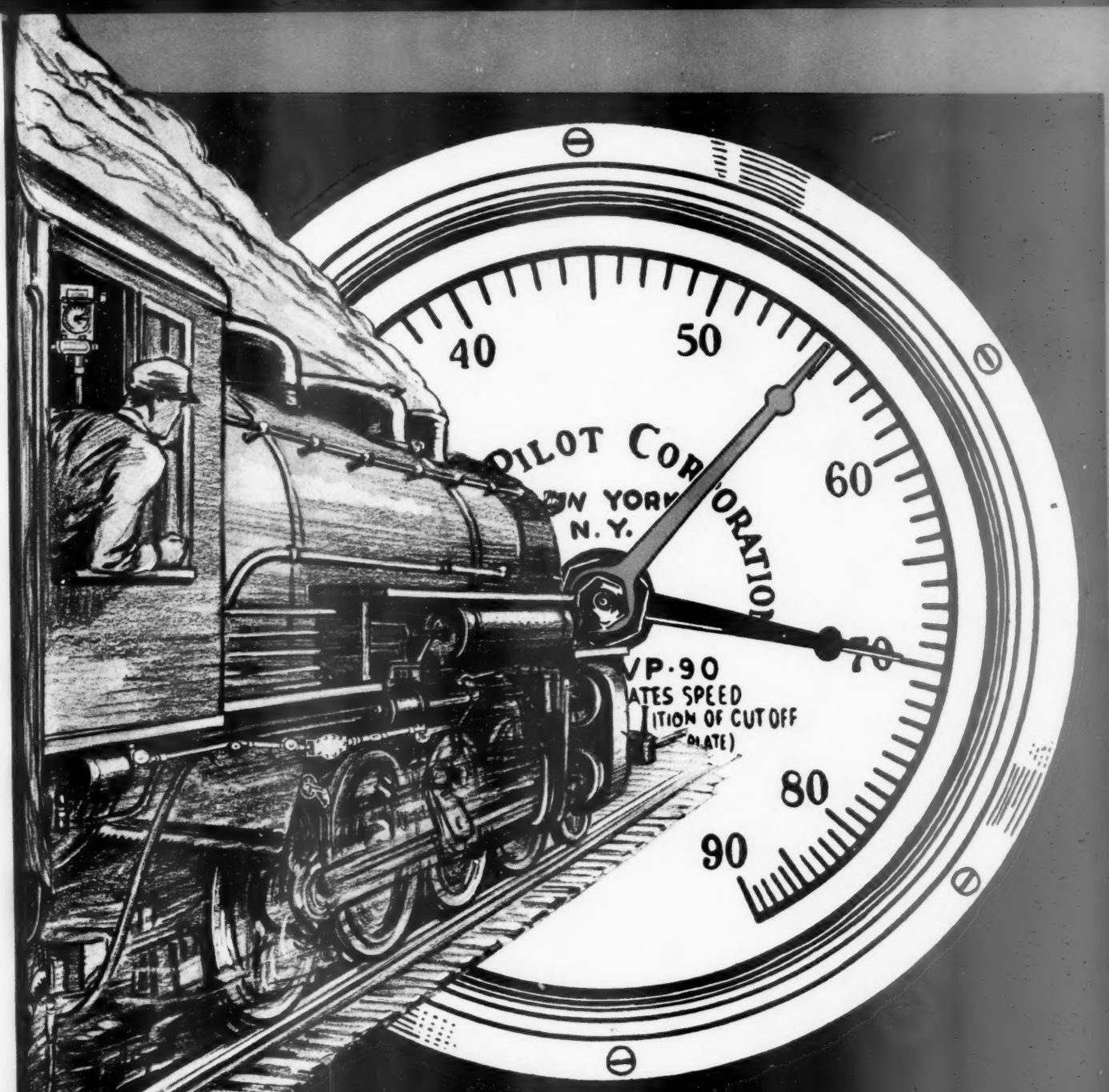
CENTRAL ALLOY DIVISION, MASSILLON, OHIO

AGATHON NICKEL IRON

REPUBLIC STEEL CORPORATION

GENERAL OFFICES YOUNGSTOWN, OHIO

AGATHON STEELS

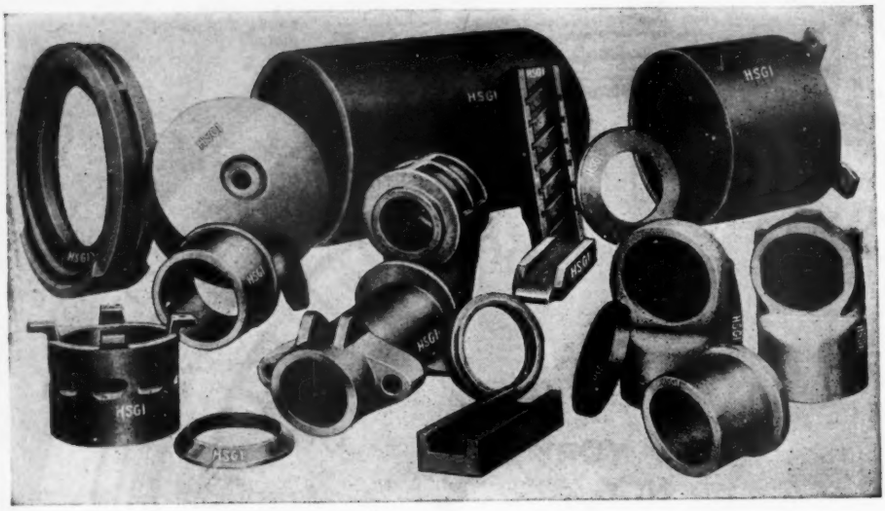


AN EVER PRESENT AID

AT every point on the run the LOCO VALVE PILOT helps the engineman to get from the locomotive maximum power or greatest fuel economy as conditions permit.

VALVE PILOT CORPORATION

230 Park Avenue, New York City



THE HUNT-SPILLER AIR FURNACE GUN IRON



Diesel Liner

HSGI
Reg. U. S. Trade Mark

Cylinder Bushings
Cylinder Packing Rings
Pistons or Piston Bull Rings
Valve Bushings
Valve Packing Rings
Valve Bull Rings
Crosshead Shoes
Hub Liners
Shoes and Wedges
Floating Rod Bushings

Parts Finished For Application

Dunbar Sectional Type Packing
Duplex Sectional Type Packing for Cylinders and Valves
(Duplex Springs for Above Sectional Packing)
Cylinder Snap Rings
Valve Rings All Shapes



Diesel Piston



NEW TREND

Proves Quality Materials A Vital Factor • • •

LONG runs . . . short layovers . . . high pressures . . . increasing temperatures . . . longer trains . . . faster speeds . . . more revenue miles every month. New operating programs . . . all proving that the earning power of a locomotive depends upon the quality of the wearing parts.

Among the materials which have made the modern, high revenue producing locomotive possible, HUNT-SPILLER *Air Furnace* GUN IRON stands out as one of the greatest contributing factors.

A superior wear-resisting material meeting every new requirement with the record of over a century of leadership based on advanced metallurgical control, engineering design, precision and care of manufacture, producing a special material for a special purpose.

Every new era in locomotive operation finds more jobs for HUNT-SPILLER *Air Furnace* GUN IRON. Its scope of application is constantly increasing. Today it is standard on most of the North American railways — resisting frictional wear and high temperatures . . . protecting locomotive efficiency . . . preventing failures . . . reducing fuel and maintenance costs.

Railroads figuring on the construction of Diesel powered locomotives and light weight trains will be interested in the economies which are being effected by HUNT-SPILLER *Air Furnace* GUN IRON liners, pistons and packing rings in this class of service. Complete performance data upon request.



HUNT-SPILLER Duplex Sectional Packing for Locomotive Valves.

HUNT-SPILLER Duplex Sectional Packing for Locomotive Cylinders.

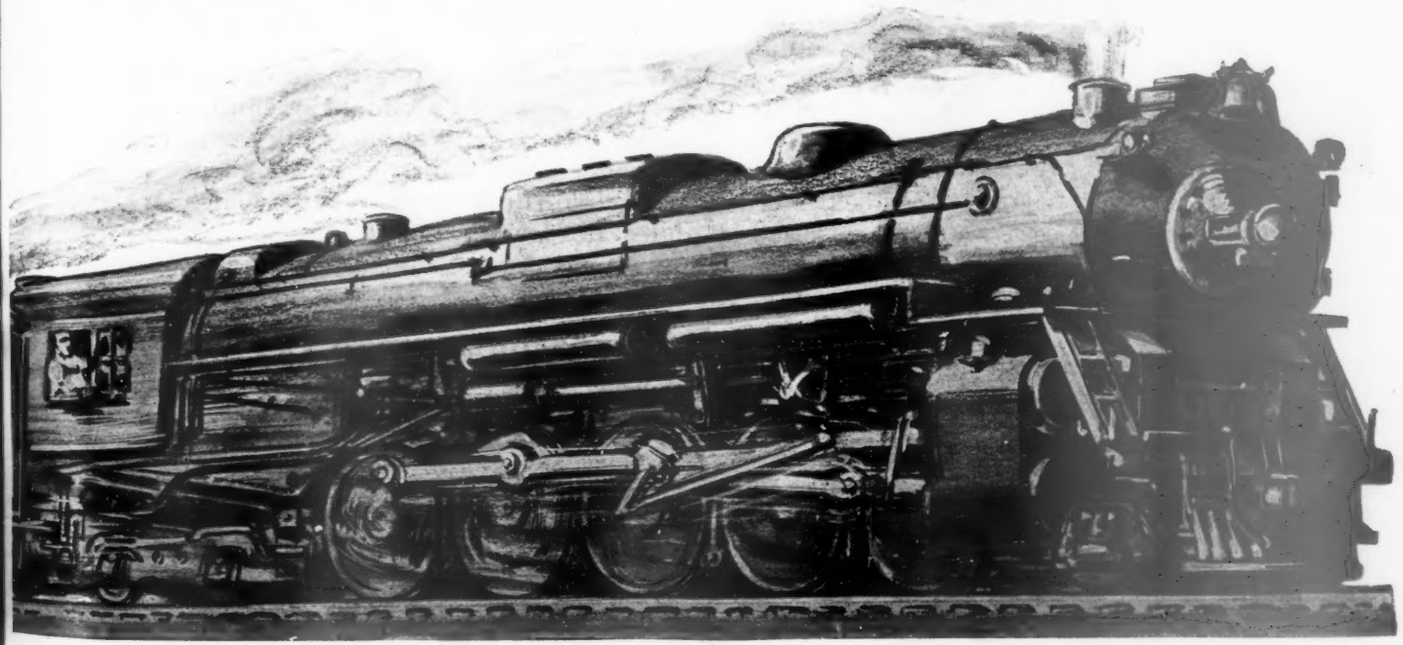
HUNT-SPILLER MFG. CORPORATION

J. G. Platt, Pres. & Gen. Mgr. — V. W. Ellet, Vice-President

Office & Works

383 Dorchester Ave. South Boston, 27, Mass.

Canadian Representative: Joseph Robb & Co., Ltd., 70 North Bank Rd., Montreal, P. Q.
Export Agent for Latin America:
International Rwy. Supply Co., 30 Church Street, New York, N. Y.



"On Guard"



BARCO

LOW WATER ALARMS Ordered for Sentry Duty on 126 More Modern Engines



The Barco Low Water Alarm can be tested in two minutes at any time or place under conditions exactly duplicating low water conditions without lowering the water in the boiler or making any adjustments.

NO water level will reach the danger sector on these locomotives without a warning from the *Barco* Low Water Alarm in ample time to prevent explosion and scorched crown sheets.

Barco Low Water Alarms are guarding more of the modern power on more of the railroads every month. Their dependable performance, low initial cost, and freedom from maintenance are outstanding factors which appeal to supervisors of locomotive operation and maintenance.

The *Barco* Low Water Alarm stands guard twenty-four hours a day — always ready to sound the warning when disaster threatens. Its reliability offers big savings in firebox maintenance costs and inspires confidence in the crews thus eliminating many repairs which are caused by high water levels.

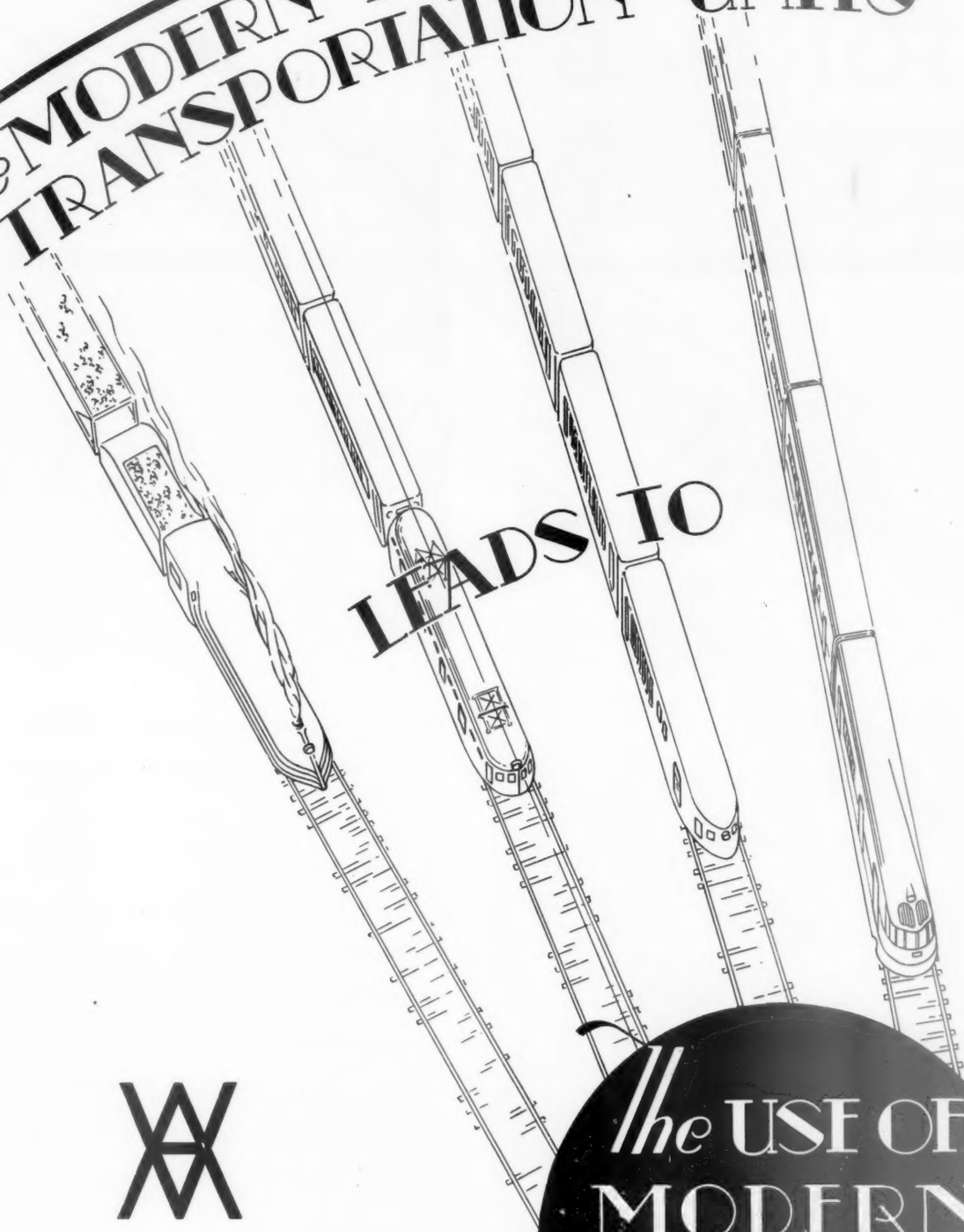
These savings refund the investment many times during the life of the alarm.

Barco Manufacturing Co.
1801 Winnemac Avenue, Chicago, Illinois
THE HOLDEN CO., LTD.
In Canada
Montreal—Moncton—Toronto
In Canada
Winnipeg—Vancouver

BARCO Low Water ALARM

Always Functions When Low Water Threatens

The MODERN TREND in TRANSPORTATION UNITS



LEADS TO

The USE OF MODERN AIR BRAKES

WESTINGHOUSE AIR BRAKE CO.
General Office and Works — Wilmerding, Pa.

TONNAGE





& SPEED!



Tonnage and more tonnage; speed and more speed.

These are the requirements of modern railroading.

No wonder the operating officer is calling for new power.

We are entirely in accord with the operating officer, but until the new power is bought, why not get all there is out of the old power by equipping it with Standard Stokers?

The cost is nominal. The results well worth consideration even though the old power is to be retired within the next few years.

THE STANDARD STOKER COMPANY, INC.

NEW YORK • CHICAGO • ERIE

Outstanding Achievements with FIREBARS

The Efficient COAL BURNER

IN this period of rapidly rising coal costs, FIREBARS, the improved coal burning platform, have enabled these Class 1 railroads to effect real FUEL SAVINGS. Economies on FIREBAR-equipped locomotives are sufficient to pay the small cost of FIREBARS in from four to six months.

WAUGH FIREBAR BETTER FIRES

NEW YORK CENTRAL
N. Y., N. H., & H.
BOSTON & MAINE
MAINE CENTRAL
LEHIGH VALLEY
ERIE
LACKAWANNA
PITTS. & LAKE ERIE
CHESAPEAKE & OHIO
SEABOARD AIR LINE
RICHMOND, F. & POTOMAC
BIG FOUR
UNION PACIFIC
MILWAUKEE
GREAT WESTERN
FRISCO
MISSOURI, KANSAS & TEXAS
MISSOURI PACIFIC
PERE MARQUETTE
INDIANA HARBOR
MICHIGAN CENTRAL
CHICAGO & EASTERN ILLINOIS
CHICAGO JUNCTION

FIREBAR DIVISION
of the
WAUGH EQUIPMENT COMPANY

New York Cleveland Chicago St. Louis

Canadian Waugh Equipment Company, Montreal, Que.

LESS FUEL • • LESS SMOKE • • LESS STEAM FAILURES • • LESS PLUGGING OF FLUES • • LESS ASH PAN MAINTENANCE
LESS INVENTORIES FOR MAINTENANCE • • LESS TIME REQUIRED TO CLEAN AND DUMP FIRES.

QUIT GUESSING
ABOUT DELIVERIES
USE
RAILWAY EXPRESS

Why worry about your shipments? It is easy to make sure that they will go through quickly and safely by handling them through the responsible, nation-wide organization of Railway Express. By this way you are sure of swift transportation, careful handling, and prompt delivery on arrival in all important cities and towns.

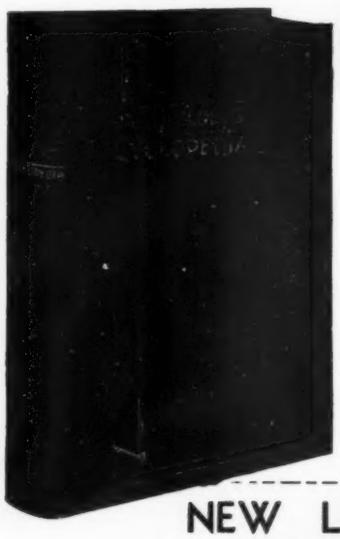
Our double receipt system, both on pick-up and delivery, gives an accurate check on the time of transit and arrival. Rates include liability, and are moderate for the quality of the service offered. Telephone your local Railway Express Agent for service or information and make a point of specifying Railway Express for everything you want to ship.

The best there is in transportation

SERVING THE NATION FOR 95 YEARS ✦ NATION-WIDE SERVICE



RAILWAY EXPRESS AGENCY, Inc.



Car Builders' Cyclopedia
of American Practice

Edited by Roy V. Wright

Editor of "Railway Mechanical Engineer"

Prepared under the auspices of the Mechanical Division of the American Railway Association this book is indispensable to car shop superintendents, master car builders, general foremen and others in charge of the construction and repair of rolling stock. The Thirteenth Edition contains new equipment, standard specifications, recommended practices, scale drawings, illustrations, and technical data regarding all kinds of manufactured products used in car work.

SECTIONS

Dictionary of Terms—Freight Equipment Cars—Freight Car Construction Details—Railway Service Cars—Passenger Equipment Cars—Rail Motor Cars—Passenger Car Construction and Equipment—Passenger Train Lighting—Passenger Train Heating—Ventilation and Air Conditioning—Car Trucks, Lubrication and Roller Bearings—Draft Gears, Couplers and Buffers—Air Brakes and Signals—Brake Gears—Safety Appliances—Shops and Car Maintenance—Car Inspection, Interchange, Loading—Car Materials—Industrial and Mine Cars—Foreign Cars—Indexes. 1260 pages, 3,400 illustrations, including fold-in charts, 9" x 12" x 3". Buckram binding, $5.00; leather binding, $7.00.

NEW LOW PRICE

Simmons-Boardman Publishing Company
30 Church Street, New York, N. Y.

Send me on 10 days' Free Examination, the Car Builders' Cyclopedia. I will either remit the list price of $2.50 or return the book within that time.

Name.....

Address.....

City..... State.....

Company..... Position.....

(Books sent on approval to retail purchasers in the U. S. and Canada only) R. A. 6-30-34



INDUSTRIAL BROWNHOIST

...presents a new heavy-duty Diesel Crane...

From the shops of the country's oldest and largest builders of locomotive cranes comes the new Industrial Brownhoist No. 8 Diesel crane. Its advanced construction sets new performance standards.

Smooth flowing power . . . long lasting service . . . cannot be built into a Diesel (or gas) crane simply by substituting an internal combustion engine for a steam engine and boiler. This new No. 8 is built from the ground up for Diesel (or gas) power.

The heavy-duty construction of this 35-40 ton crane includes a one-piece cast steel rotating bed, rotating and travel clutch bevel gears and all spur gears cut from the solid; alloy steel main shafts; three travel speeds.

The No. 8 Industrial Brownhoist Diesel, shown above, was purchased by the Toledo, Peoria and Western Railroad for bucket and hook work and for driving piles. May we tell you more about it?

INDUSTRIAL BROWNHOIST CORPORATION

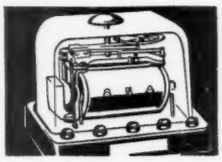
General Offices: Bay City, Michigan

District Offices: New York, Philadelphia, Chicago, Cleveland

INDUSTRIAL BROWNHOIST

THE COMPLETE LINE OF LOCOMOTIVE AND CRAWLER CRANES

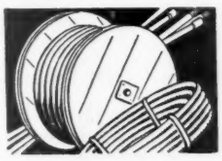
A recovery check list for railroads



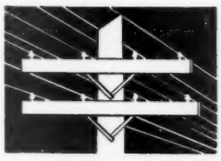
✓ *Train Dispatching Equipment* . . . Check up on your train dispatching equipment. Bring it up to date with a new Western Electric selector key . . . jack box . . . selector . . . loudspeaker.



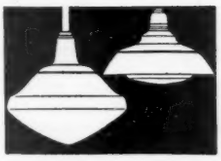
✓ *Motors and Control* . . . Turn to Graybar for dependable, standard motors and control. Meet any motor need quickly and conveniently from a Graybar warehouse.



✓ *Wire and Cable* . . . For vital circuits—dependable wire and cable from Graybar. All kinds—including Western Electric Lead Covered Cable.



✓ *Line Construction Materials* . . . Pole line construction materials may be ordered, shipped, and assembled economically and conveniently from Graybar.



✓ *Lamps and Lighting* . . . A complete selection of quality lamps, fixtures and glassware is readily available from Graybar. Meets exacting railroad needs.



✓ *Underground Materials* . . . Graybar is the logical source of every type of conduit for railroad use—also conduit fittings, tools, transformers, accessories.

Distributed by GraybaR ELECTRIC COMPANY

OFFICES IN 73 PRINCIPAL CITIES. EXECUTIVE OFFICES, GRAYBAR BLDG., NEW YORK, N. Y.



The International Limited—Montreal, Toronto, Chicago

DeVILBISS SPRAY-PAINTING for CANADIAN NATIONAL RAILWAYS

Evidence of the quality and efficiency of DeVilbiss Spray-Painting Equipment is its adoption by Canadian National Railways for their painting operations.

DeVilbiss Equipment is widely used by leading railroads, as it is especially designed for the most efficient and most economical painting of passenger cars and freight cars, locomotives, structures and buildings.

For better paint jobs that result in improved appearance and greater protection, for faster, more efficient operations that lower painting costs—standardize on new and modern DeVilbiss Spray-Painting and Canopy Exhaust Equipment.

Near you is an experienced DeVilbiss representative, whose advice on all matters relating to spray-painting can be of real value to you. Consult him now, or write us direct.

THE DEVILBISS COMPANY, TOLEDO, OHIO

New York Philadelphia Cleveland Detroit Chicago St. Louis San Francisco Windsor, Ontario

DeVilbiss

Direct sales and service representatives available everywhere



A. R. A. STANDARD COUPLERS

Including

SWIVEL COUPLERS

With

SWIVEL BUTTS

Or

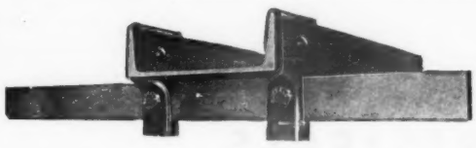
SWIVEL YOKES

Pitt Passenger Couplers

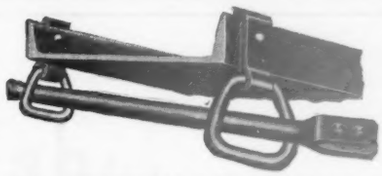
STEEL CASTINGS

McConway & Torley Corporation

Pittsburgh, Pa.



"BUFFALO"
BRAKE BEAMS



BRAKE BEAM SUPPORT
Meets A. R. A. requirements.
Support bar held in tension.
Pins doubly locked to brackets.
All vibration absorbed.
Tight rivets assured.
Proven by tests.

For All Classes of Cars, Locomotives and Electric Equipment

Buffalo Brake Beam Co.

NEW YORK
BUFFALO HAMILTON, ONT.

BOTTOM ROD SUPPORT
Meeting all Requirements.
Loop held by friction.
Obstructions swing it clear.
No bending or binding.
Permitting free brake movement.
Folds up for channel removal.
Made to fit any channel.

"Arctic" BRONZE
CROWN BEARINGS

CHILL CAST



METAL MOULDS
(Patented)

WRITE FOR PRINT LISTING SIZES
NATIONAL BEARING METALS CORP.
ST. LOUIS, MO.
New York, N. Y. Jersey City, N. J. Pittsburgh, Pa. Meadville, Pa. Portsmouth, Va. St. Paul, Minn.
1

NATIONAL CARBIDE



Y-199 Handy Light

LANTERNS and National Carbide V. G. Flarelights —the highest development in carbide lighting equipment.

Lanterns with blue rear light for car inspection — with red rear light for motor car headlights and signal lights — handy lamps and portable lights for track maintenance —standard on many railroads.



W L I-C Lantern

NATIONAL CARBIDE SALES CORP.
LINCOLN BLDG., 60 EAST 42nd ST., NEW YORK, N.Y.

If you are looking for a man
or in need of a position,
your advertisement
should appear in the
Get Together Department

SUNBEAM HEADLIGHTS WILL OUTLAST the LOCOMOTIVE -

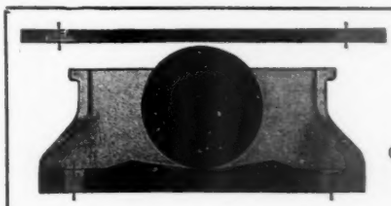


Rust-Proof Headlight No. 4414

STURDILY constructed of Rust Proof Steel, Sunbeam Headlights are built for permanent dependability. They will resist wear and tear longer than the locomotive to which they are applied. Available in 12 inch and 14-inch sizes, with glass reflectors, Sunbeam Headlights afford low-cost lighting service, because they need never be replaced

Write for complete catalog

SUNBEAM ELECTRIC MFG. CO.
NEW YORK SAN FRANCISCO PHILADELPHIA EVANSVILLE, INDIANA, U.S.A. DENVER RICHMOND INDIANAPOLIS



STUCKI SIDE BEARINGS
Manufactured by
A. Stucki Co.
Oliver Bldg., Pittsburgh, Pa.
Canadian Representatives
The Holden Co., Ltd.,
Montreal, Can.

Steam *and* Electric Specialties
for
Passenger Car Heating
GOLD CAR HEATING & LIGHTING CO.
NEW YORK

GET TOGETHER DEPARTMENT

EDUCATIONAL

THE Railway Educational Bureau, Omaha, Neb., offers a distinctive education service for Supervisors and other employes. Write for FREE Special Bulletin.

Your classified advertisement should appear in this section

POSITION OPEN

SALARIED POSITIONS $2,500 to $25,000—This thoroughly organized advertising service of 24 years' recognized standing and reputation carries on preliminary negotiations for positions of the caliber indicated, through a procedure individualized to each client's personal requirements. Several weeks are required to negotiate, and each individual must finance the moderate cost of his own campaign. Retaining fee protected by a refund provision as stipulated in our agreement. Identity is covered and, if employed, present position protected. If you have actually earned over $2,500, send only name and address for details.

R. W. BIXBY, Inc.,
102 Delward Bldg., Buffalo, N. Y.

Index to Advertisers

June 30, 1934

A

Ajax Hand Brake Co. 54
Aluminum Company of America 23
American Arch Co., Inc. 61
American Brake Shoe & Foundry Co. 20
American Hair & Felt Co. 46
American Locomotive Co. 26, 27, 28
American Spiral Spring & Mfg. Co. 11 to 16
American Steel & Wire Co. 24
American Steel Foundries 11 to 16
Armco Railroad Sales Co. 29
Association of Manufacturers of Chilled Car Wheels 33

B

Baldwin Locomotive Works, The 6, 7
Barco Manufacturing Co. 70
Bethlehem Steel Company 17
Bettendorf Company, The 11 to 16
Birdsboro Steel Foundry & Mach. Co. 11 to 16
Bixby, Inc., R. W. 79
Buckeye Steel Casting Co. 11 to 16
Buffalo Brake Beam Co. 79

C

Camel Sales Company 57
Cardwell Westinghouse Co. 44
Carnegie Steel Co. 35
Chicago Railway Equipment Co. 48
Classified Advertisements 79
Commercial Solvents Corp. 51

D

Dearborn Chemical Co. 38
DeVilbiss Company, The 78
Dry-Zero Corporation 46
Duryea Corporation, O. C. 52

E

Edgewater Steel Company 81
Electro Metallurgical Sales Corp. 47

F

Fafnir Bearing Company 40
Firebar Div. of Waugh Equipment Co. 73
Flannery Bolt Company 67a
Fort Pitt Springs Co. 11 to 16
Franklin Railway Supply Co., Inc. 60

G

General Railway Signal Co. 8, 9, 82
General Steel Castings Corp. 21
Get Together Department 79
Gold Car Heating & Lighting Co. 79
Gould Coupler Co., The 11 to 16
Graybar Electric Co. 77
Griffin Wheel Co. 41

H

Harbison-Walker Refractories Co. 61
Hunt-Spiller Manufacturing Corp. 68, 69

I

Illinois Steel Co. 22
Industrial-Brownhoist Corp. 77
Ingersoll-Rand Company 53
International Nickel Co., Inc., The 55

J

Johns-Manville Co. 42

K

Kerite Insulated Wire & Cable Co., Inc. 78
Kinetic Chemicals, Inc. 32

L

Lima Locomotive Works, Inc. 59
Lockhart Iron & Steel Co. 56
Locomotive Firebox Co. 37

Mc

McConway & Torley Corp. 78

M

Magnus Company, Inc. 36
Miner, Inc., W. H. 3

N

National Aluminate Corp. 4
National Bearing Metals Corp. 79
National Carbide Sales Corp. 79
National Malleable & Steel Castings Co. 65, 66
National Tube Company 67
New York Air Brake Co, The 45

O

Ohio Steel Foundry Co., The 11 to 16
Oxweld Railroad Service Co., The 39

P

Pittsburg Spring & Steel Co. 11 to 16
Pittsburg Steel Foundry Corp. 11 to 16
Pressed Steel Car Co. 11 to 16
Professional Directory 79
Pullman Car & Manufacturing Corp. Front Cover
Pyle-National Company, The 43

R

Railway Educational Bureau 79
Railway Express Agency, Inc. 76
Railway Steel-Spring Co. 11 to 16, 28
Republic Steel Corporation 58

S

Safety Car Heating & Lighting Co., The 34
Scullin Steel Company 11 to 16
Simmons-Boardman Publishing Co. 76
S. K. F. Industries, Inc. 25
Standard Steel Works Co. 11 to 16, 49
Standard Stoker Co., Inc., The 72
Stucki Company, A. 79
Sturtevant Co., B. F. 30
Sunbeam Elec. Mfg. Co. 79
Superheater Company, The 62, 63

T

Timken Roller Bearing Co., The 31

U

Union Carbide & Carbon Corp. 39, 47
Union Spring & Mfg. Co. 11 to 16
Union Switch & Signal Co. 64, 82

V

Valve Pilot Corp. 67b
Vanadium Corp. of America 50
Vapor Car Heating Co., Inc. 10

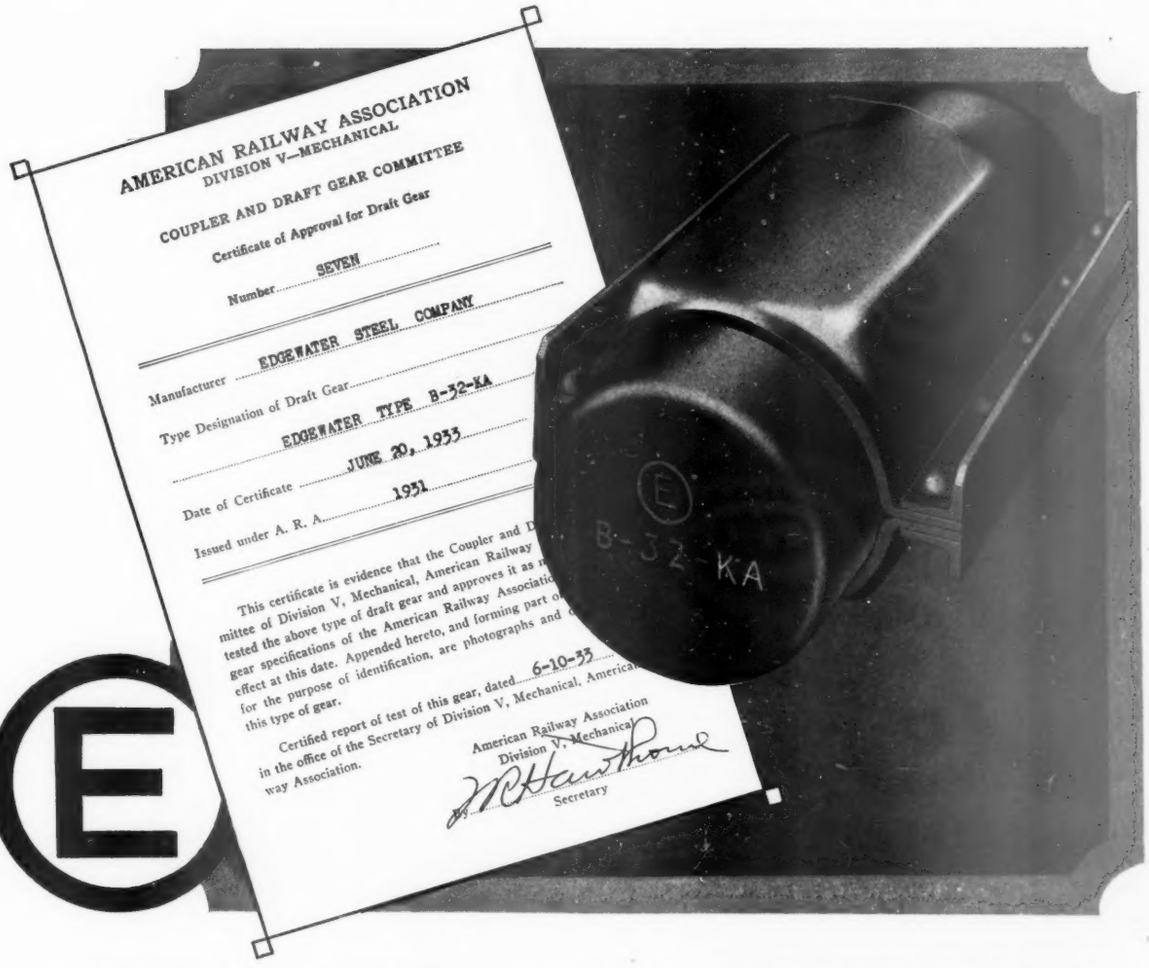
W

Walworth Company, The 2
Waugh Equipment Co. 73
Westinghouse Air Brake Co. 71
Winton Engine Corp. 18, 19

The EDGEWATER RING SPRING DRAFT GEAR

Awarded Certificate of Approval by the

AMERICAN RAILWAY ASSOCIATION



EDGEWATER STEEL COMPANY

PITTSBURGH PENNSYLVANIA

Atlanta Boston Kansas City New York Portland
Baltimore Chicago Louisville Philadelphia San Francisco
St. Louis Seattle St. Paul Washington

Index to Advertisers

June 30, 1934

A

Ajax Hand Brake Co. ... 54
Aluminum Company of America ... 23
American Arch Co., Inc. ... 61
American Brake Shoe & Foundry Co ... 20
American Hair & Felt Co ... 46
American Locomotive Co ... 26, 27, 28
American Spiral Spring & Mfg. Co ... 11 to 16
American Steel & Wire Co ... 24
American Steel Foundries ... 11 to 16
Armco Railroad Sales Co ... 29
Association of Manufacturers of Chilled Car Wheels ... 33

B

Baldwin Locomotive Works, The ... 6, 7
Barco Manufacturing Co ... 70
Bethlehem Steel Company ... 17
Bettendorf Company, The ... 11 to 16
Birdsboro Steel Foundry & Mach. Co ... 11 to 16
Bixby, Inc., R. W ... 79
Buckeye Steel Casting Co ... 11 to 16
Buffalo Brake Beam Co ... 79

C

Camel Sales Company ... 57
Cardwell Westinghouse Co ... 44
Carnegie Steel Co ... 35
Chicago Railway Equipment Co ... 48
Classified Advertisements ... 79
Commercial Solvents Corp ... 51

D

Dearborn Chemical Co ... 38
DeVilbiss Company, The ... 78
Dry-Zero Corporation ... 46
Duryea Corporation, O. C ... 52

E

Edgewater Steel Company ... 81
Electro Metallurgical Sales Corp ... 47

F

Fafnir Bearing Company ... 40
Firebar Div. of Waugh Equipment Co ... 73
Flannery Bolt Company ... 67a
Fort Pitt Springs Co ... 11 to 16
Franklin Railway Supply Co., Inc ... 60

G

General Railway Signal Co ... 8, 9, 82
General Steel Castings Corp ... 21
Get Together Department ... 79
Gold Car Heating & Lighting Co ... 79
Gould Coupler Co., The ... 11 to 16
Graybar Electric Co ... 77
Griffin Wheel Co ... 41

H

Harbison-Walker Refractories Co ... 61
Hunt-Spiller Manufacturing Corp ... 68, 69

I

Illinois Steel Co ... 22
Industrial-Brownhoist Corp ... 77
Ingersoll-Rand Company ... 53
International Nickel Co., Inc., The ... 55

J

Johns-Manville Co ... 42

K

Kerite Insulated Wire & Cable Co., Inc ... 78
Kinetic Chemicals, Inc ... 32

L

Lima Locomotive Works, Inc ... 59
Lockhart Iron & Steel Co ... 56
Locomotive Firebox Co ... 37

Mc

McConway & Torley Corp ... 78

M

Magnus Company, Inc ... 36
Miner, Inc., W. H ... 3

N

National Aluminate Corp ... 4
National Bearing Metals Corp ... 79
National Carbide Sales Corp ... 79
National Malleable & Steel Castings Co ... 65, 66
National Tube Company ... 67
New York Air Brake Co, The ... 45

O

Ohio Steel Foundry Co., The ... 11 to 16
Oxweld Railroad Service Co., The ... 39

P

Pittsburg Spring & Steel Co ... 11 to 16
Pittsburg Steel Foundry Corp ... 11 to 16
Pressed Steel Car Co ... 11 to 16
Professional Directory ... 79
Pullman Car & Manufacturing Corp ... Front Cover
Pyle-National Company, The ... 43

R

Railway Educational Bureau ... 79
Railway Express Agency, Inc ... 76
Railway Steel-Spring Co ... 11 to 16, 28
Republic Steel Corporation ... 58

S

Safety Car Heating & Lighting Co., The ... 34
Scullin Steel Company ... 11 to 16
Simmons-Boardman Publishing Co ... 76
S. K. F. Industries, Inc ... 25
Standard Steel Works Co ... 11 to 16, 49
Standard Stoker Co., Inc., The ... 72
Stucki Company, A ... 79
Sturtevant Co., B. F ... 30
Sunbeam Elec. Mfg. Co ... 79
Superheater Company, The ... 62, 63

T

Timken Roller Bearing Co., The ... 31

U

Union Carbide & Carbon Corp ... 39, 47
Union Spring & Mfg. Co ... 11 to 16
Union Switch & Signal Co ... 64, 82

V

Valve Pilot Corp ... 67b
Vanadium Corp. of America ... 50
Vapor Car Heating Co., Inc ... 10

W

Walworth Company, The ... 2
Waugh Equipment Co ... 73
Westinghouse Air Brake Co ... 71
Winton Engine Corp ... 18, 19

The EDGEWATER RING SPRING DRAFT GEAR

Awarded Certificate of Approval by the

AMERICAN RAILWAY ASSOCIATION



EDGEWATER STEEL COMPANY

PITTSBURGH PENNSYLVANIA

Atlanta Boston Kansas City New York Portland
Baltimore Chicago Louisville Philadelphia San Francisco
St. Louis Seattle St. Paul Washington

Signal Modernization Effects Economies

Railroads in order to maintain efficiency in operation require frequent additions and replacements. Expenditures for the modernization of signaling will not only increase efficiency and safety, but will also save enough in maintenance and operating costs to pay for the installations and to create an annual return on the investment.

"Recently, one railroad reviewed the economies of 175 signaling projects that were completed during the past seven years and found that the net annual saving resulting from a total expenditure of $572,012 is $457,184 or 79 per cent. . . . Many of these projects were comparatively small, the average expenditure being only $3,269, and the average net saving amounting to $2,612."*

* Railway Signaling, Oct., 1933, p. 280.

A survey of your operating requirements at this time would probably show that a modest expenditure for signal modernization would prove highly beneficial to your road.

UNION SWITCH & SIGNAL COMPANY
Swissvale, Pennsylvania

GENERAL RAILWAY SIGNAL COMPANY
Rochester, N. Y.

107



History in the Making

The Illinois Central Railroad in 1926 was the first road to equip a division, 97.6 miles of single track, with automatic train stop and two indication continuous cab signals without permissive wayside signals.